Final
Work Plan
Data Gap Investigation of Soil Under Buildings on Parcel C

Hunters Point Shipyard
San Francisco, California

December 2009

Prepared for:

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108

Prepared by:

CH2M HILL-Kleinfelder Joint Venture
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Contract No.: N62473-09-D-2622
CTO No.: 0003
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Prepared for:

NAVFAC
Naval Facilities Engineering Command
NAVFAC SOUTHWEST

Prepared by:

KCH

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December 30, 2009
Date

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KCH Task Order Manager

December 30, 2009
Date

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Appendices

Acronyms and Abbreviations

APPL	Agriculture and Priority Pollutants Laboratory, Inc.
ARAR	Applicable or Relevant and Appropriate Requirements
BCT	BRAC Cleanup Team
BMP	Best Management Practice
BRAC	Base Realignment and Closure
BTEX	Benzene, ethylbenzene, toluene, and xylenes
CCR	California Code of Regulations
CE2	CE2 Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DPT	direct-push technology
DQO	data quality objective
DTSC	California Department of Toxic Substances Control
HDPE	high-density polyethylene
HPS	Hunters Point Shipyard
IR	Installation Restoration
KCH	CH2M HILL-Kleinfelder Joint Venture
msl	mean sea level
Navy	United States Department of the Navy
NEDD	Naval Electronic Data Deliverable
NIRIS	Naval Installation Restoration Information Solution
NNP	non-Navy property
NPL	National Priorities List
NRDL	Naval Radiological Defense Laboratory
PAH	Polycyclic Aromatic Hydrocarbon
PCBs	polychlorinated biphenyls
QC	quality control
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RWQCB	California Regional Water Quality Control Board – San Francisco Bay Region
SAP	Sampling and Analysis Plan
SSHP	Site-Specific Safety and Health Plan
T&D	Transportation and disposal
TIZ	Tidally-Influenced Zone
TMZ	Tidal Mixing Zone
TPH	Total Petroleum Hydrocarbons
TtEC	Tetra Tech EC
U.S. EPA	United States Environmental Protection Agency
USC	United States Code
VOC	volatile organic compound

1.0 Introduction

The CH2M HILL-Kleinfelder Joint Venture (KCH) has prepared this Work Plan to further investigate and document the need for remediation under certain buildings in Parcel C, Hunters Point Shipyard (HPS), San Francisco, California. This work will be performed for the U.S. Department of the Navy (Navy), Base Realignment and Closure (BRAC) Project Management Office West, in accordance with Contract No. N62473-09-D-2622. The investigation will be conducted and reported by KCH. KCH will subcontract services for subsurface geophysics, concrete coring, location surveying, chemical analysis, and data validation.

A Sampling and Analysis Plan (SAP) is included as Appendix A. This Work Plan references figures and tables provided in Appendix A, rather than duplicating these items.

Two of the four buildings under investigation are designated as radiation-impacted areas. Field work will be coordinated with the HPS radiation safety program developed and administered under a separate contract between the Navy and Tetra Tech EC (TtEC).

1.1 Objectives and Scope of Work

The objective of this data gap investigation is to further investigate and document the need for soil remediation under certain buildings on Parcel C. The results from this data gap investigation will be used in the forthcoming Draft Record of Decision (ROD) for Parcel C to better define the extent of excavation needed if building foundations are removed and to provide additional data for the Total Petroleum Hydrocarbon Corrective Action Plan (TPH CAP). Field work and sampling analysis and validation will be done as expeditiously as possible. This scope includes a 48-hour turn-around on sampling analysis to keep the project moving and to expedite the determination of whether step-out sampling is needed.

Prior to the completion of the Draft ROD for Parcel C, the Navy needs to complete a data gap investigation of the soil under specific buildings in Parcel C to assess the extent of contamination under the foundations of the buildings. This data will provide necessary details for the completion of the ROD for Parcel C and TPH CAP.

The purpose of this investigation is to obtain additional information regarding the lateral extent of the following analytes in soil under certain buildings in Parcel C:

- Copper
- Lead
- Manganese
- Mercury
- Hexavalent chromium
- Organic lead
- Polycyclic aromatic hydrocarbons (PAHs)

- Naphthalene
- Polychlorinated biphenyls (PCBs) (Aroclor 1260)
- Total petroleum hydrocarbons – extractable
- Total petroleum hydrocarbons – purgeables
- Volatile Organic Compounds (VOCs)
- Benzene, toluene, ethylbenzene, and xylenes (BTEX)

This data gap investigation is part of ongoing efforts by the Navy to address contamination at HPS Parcel C in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) by providing data for use in preparing the ROD for Parcel C and to provide additional data for the TPH CAP

The specific goals of this investigation, presented below, are to provide additional analytical data for soil under buildings that will be incorporated into the ROD, remedial design and subsequent remedial action for Parcel C:

1. Provide data to evaluate whether contaminants of concern are present in soil under Building 134.
2. Provide data to evaluate whether contaminants of concern are present in soil under Building 203.
3. Provide data to evaluate whether contaminants of concern are present in soil under Building 214.
4. Provide data to evaluate whether contaminants of concern are present in soil under Building 231E.

The site investigation will be implemented using the following approach:

1. Collect soil samples from 14 boreholes located within certain buildings using a hand auger and slide hammer type sampler.
2. Collect soil samples from up to 22 step out boreholes located within certain buildings using a hand auger and slide hammer type sampler.

The results of the data gap investigation will be presented in a Technical Memorandum.

1.2 Project Schedule

Field sampling is scheduled to begin in December 2009 followed by issuance of a Technical Memorandum. The anticipated schedule for field work and reporting is presented in Worksheet #16 of the SAP.

1.3 Project Organization and Points of Contact

Worksheet #7 in the SAP shows the project roles and contact information for key Navy, KCH, subcontractors, and regulatory individuals involved with the Parcel C investigation project. A project organization chart is provided as Worksheet #5 in the SAP.

1.4 Work Plan Organization

This Work Plan is organized as follows:

Section 1.0, Introduction – An overview of the project objectives, project scope of work, project schedule, project organization, project points of contact, and the organization of the Work Plan.

Section 2.0, Site Conditions and Background – A summary of the site background, history, hydrogeology, previous investigations and remedial actions taken to date.

Section 3.0, Regulatory Framework – Decision makers, technical or regulatory standards, and permitting.

Section 4.0, Technical Approach - A description of the planned site investigation activities.

Section 5.0, References – A list of documents cited in this Work Plan.

Appendix A – Sampling and Analysis Plan (SAP)

Appendix B – Background Information Provided by the Navy

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2.0 Site Conditions and Background

The location of HPS and parcel divisions within HPS are shown in SAP Figure 10-1. SAP Figure 10-2 shows Parcel C and investigation locations where this scope of work will be performed.

2.1 Hunters Point Shipyard Parcel C Background

HPS was owned and operated as a commercial dry dock facility until 1939, when the Navy purchased the property from Bethlehem Steel. Upon the entry of the U.S. into World War II in 1941, the Navy immediately began to expand HPS into a naval shipyard. The Navy began excavation of the hills surrounding the shipyard, using the resulting spoils to expand the shoreline into the Bay. Quays, docks, and support buildings were built on an expedited wartime schedule to support the shipyard's mission of fleet repair and maintenance.

Parcel C historically included about 79 acres in the central portion of the shipyard (Figure 10-1). Parcel C was formerly part of the industrial support area used for shipping, ship repair, and office and commercial activities. Industrial support facilities for ship repair dominated the land use at Parcel C. These support facilities included a foundry, a power plant, a sheet manufacturing shop, a paint shop, and various machine shops; 70 buildings are located within the boundaries of Parcel C (Figure 10-2). The docks at Parcel C were formerly part of the industrial production area. Portions of Parcel C were also used by Naval Radiological Defense Laboratory (NRDL). In 2002, the boundaries of Parcels B and C were redefined, and Installation Restoration (IR) sites IR-06 and IR-25 became part of Parcel C. In 2008, the Navy divided the former Parcel C into two new parcels: Parcel C and Parcel UC-2. The current Parcel C is about 74 acres in size.

HPS was identified as a National Priorities List (NPL) site by the U.S. Environmental Protection Agency (U.S. EPA) in 1989. As a result, the Navy is conducting investigations in accordance with CERCLA (Title 42 *United States Code* [USC] Sections [§§] 9601-9675) at a number of sites at HPS where releases of CERCLA hazardous substance have occurred. As a management tool to accelerate site investigation, cleanup, and reuse, HPS was divided into geographic parcels and IR sites within each parcel that are evaluated concurrently.

HPS is currently divided into nine parcels; Parcels B, C, D-1, D-2, E, E-2, F, G, UC-1, and UC-2 (SAP Figure 10-1). In 1992, the Navy divided HPS into five contiguous parcels (A, B, C, D, and E) to aid in coordination and tracking of environmental investigation and cleanup. In 1996, the Navy added a sixth parcel (Parcel F), also known as the offshore area that encompasses an area of about 465 acres extending under the San Francisco Bay. In September 2004, the Navy divided Parcel E into two parcels (Parcels E and E-2) to facilitate the closure of the Parcel E-2 Landfill and its adjacent areas. In December 2004, the Navy transferred Parcel A to the San Francisco Redevelopment Agency. In 2008, the Navy divided Parcel D into four parcels (D-1, D-2, G, and UC-1) and Parcel C into two parcels (C and UC-2) to aid in coordination and tracking of environmental investigation and cleanup.

2.2 Physical Setting

Parcel C is bounded by other portions of HPS, private property, and San Francisco Bay. Historically, the dominant land use of Parcel C has been for shipping, ship repair, and office and commercial activities. According to the City and County of San Francisco's Redevelopment Plan, Parcel C will be zoned for the following reuses: research and development, mixed uses, educational and cultural, open space, and maritime/industrial uses.

Parcel C currently consists of 74 acres of shoreline and lowland coast located along the northeastern portions of HPS (Figure 10-2). Parcel C is bounded by:

- Portions of Parcel B and the San Francisco Bay (Parcel F) to the north.
- Portions of Parcel D-1 and the San Francisco Bay (Parcel F) to the south.
- The San Francisco Bay (Parcel F) to the east.
- Portions of Parcel B, Parcel UC-2, and Parcel G to the west

The maximum ground surface elevation in Parcel C is about 28 feet above mean sea level (msl). Most surface elevations in Parcel C are between 0 to 10 feet above mean sea level. More than 90 percent of Parcel C is covered by pavement and former industrial buildings. There are 70 buildings located within boundaries of Parcel C.

Although Parcel C fuel and steam lines were removed or closed in 2002, the storm drains and sanitary sewer lines beneath the parcel remain key site characteristics.

2.3 Site Description

The western portion of Parcel C comprises the original promontory, with native soil over shallow bedrock, while the majority of the parcel consists of level lowlands. The lowlands were constructed by placing fill material from various sources, including crushed serpentinite bedrock from the adjacent highland, construction debris, and waste materials (such as used sandblast materials).

The general pattern of groundwater flow is radially away from the former Parcel A topographic high (west of Parcel C) and toward the shoreline. At Parcel C, the general direction of groundwater flow is to the east, where groundwater discharges into the bay.

2.3.1 Site Use

Previous uses and background for buildings that will be investigated as part of this scope are described in this section.

Building 134 has contained offices, machine shops, a refrigeration repair shop, an industrial quality and reliability assurance laboratory, and storage facilities. A dip tank labeled "chlorinated materials" was built into the foundation and drained to a sump partially inside and partially outside of the building. An oil and water separator that connects to the sump drains was located outside of Building 134. Sludge and oily waste were observed in the dip tank and sump in 1991;

both the dip tank and sump have been removed. In one area of the machine shop, floor tile was observed saturated with, and deformed by, oil and corrosive material. A utility vault is present in the southwestern exterior of the building. Fuel distribution lines passed beneath the central part of Building 134; these lines have been removed. Fuel lines adjacent to the north and east of Building 134 were removed during removal actions at Parcel B in 2001.

Building 203 was a Power Plant and Boiler Room through 1974. After 1974 the building was just a Power Plant. PCBs are found in limited areas, apparently associated with transformers, particularly around Building 203.

Building 214 housed the Combat Weapons office while the shipyard was operating. Post-Navy, it was used as offices.

Building 231, located immediately north of Buildings 211 and 253 and south of Dry Dock 2, was historically used for heavy industrial machining. The building housed several air treatment systems, sumps, sandblasting rooms, a boiler, and subfloor trenches and piping. Five former USTs are located north and east of Building 231; three of these were removed in 1991 and the remaining two were closed in place. The tanks stored diesel and fuel oil. For this investigation, Building 231 has been divided into two sections, east and west, and shall be referred to as Building 231E and Building 231W.

2.3.2 Hydrogeology

The following is a summary of information provided in Final Work Plan for Contamination Delineation at Remedial Unit C5 (CE2, 2005). Conceptual summaries of the stratigraphy, hydrostratigraphy, recharge-discharge areas, and groundwater flow are summarized below.

2.3.3 Stratigraphy

Five principal geologic units have been defined at HPS. In order of increasing depth and approximate age (from youngest to oldest), these units are:

Artificial Fill (Qaf) – Most of the land area for HPS was created using quarried rock from upland areas. The artificial fill consists primarily of serpentinite with lesser amounts of dredged marshland deposits. The artificial fill also contains pockets of industrial fill, consisting of building debris and sandblast grit. As a result, the artificial fill is a heterogeneous mixture of unconsolidated material with a wide range of grain sizes. The artificial fill overlies natural sediments or bedrock, depending on the location. The variable thickness of the artificial fill reflects erosional features, such as stream channels in the natural sediments and an uneven bedrock surface. A relatively thin unit of colluvial debris and ravine fill underlies the artificial fill at scattered locations.

Undifferentiated Upper Sands (Quus) – This naturally-occurring unit is comprised of poorly-graded, discontinuous estuarine, lagoonal, and alluvial sand deposits that overlie, but in places interbed with, the underlying Bay Mud. These sands may also directly overlie bedrock.

Bay Mud (Qbm) – The Bay Mud unit consists of estuarine sediments that are predominantly composed of silt and clay, but may include clayey or silty sands. The Bay Mud may underlie either artificial fill or the upper sand deposits, and may overlie the deeper undifferentiated sediments or bedrock. The Bay Mud is occasionally interbedded with the upper Undifferentiated Upper Sands unit.

Undifferentiated Sediments (Qu) – This unit consists of naturally occurring unconsolidated silty or clayey sands containing discontinuous, isolated sand lenses. These sediments can underlie any of the younger units.

Franciscan Complex Bedrock (Kf) – The bedrock consists primarily of serpentinite and minor amounts of metamorphosed basalt (greenstone) or shale. Bedrock competency is variable and factures are common. The bedrock surface is irregular across the HPS.

2.3.4 Hydrostratigraphy

Four hydrostratigraphic units have been defined at HPS:

A-Aquifer - The unconfined A-Aquifer is present primarily in the artificial fill and also in the Undifferentiated Upper Sands unit. At scattered locations at HPS, the A-Aquifer has been subdivided into A-1, A-2 and A-3 units to reflect discrete and localized water-bearing zones. The A-Aquifer is unconfined. In some locations, the groundwater in shallow fractured bedrock is in hydraulic connection with the A-Aquifer.

Bay Mud Aquitard - The discontinuous Bay Mud Aquitard separates the A-Aquifer from the B-Aquifer, where present.

B-Aquifer - The B-Aquifer is discontinuous across HPS. Where present, the B-Aquifer is typically under semiconfined conditions in Undifferentiated Sediments that directly underlie the A-Aquifer where the Bay Mud Aquitard is absent.

Bedrock Water-Bearing Zone - The Bedrock Water-Bearing Zone consists of isolated pockets of fractured bedrock that are not hydraulically connected to upper hydrostratigraphic units.

2.4 Recharge and Discharge

Most groundwater recharge occurs by direct infiltration of precipitation falling on the upland areas on Non-Navy Property (NNP), and by precipitation falling on unpaved areas on-site. Most precipitation at HPS occurs during November through April.

Groundwater discharges at HPS from the A-Aquifer to San Francisco Bay along a Tidal Mixing Zone.

Vertical gradients suggest that groundwater can flow either upward or downward between the A-Aquifer and B-Aquifer depending on localized conditions, where the Bay Mud Aquitard is absent.

2.4.1 Groundwater Flow Direction

A-Aquifer

Groundwater in the A-Aquifer generally flows from NNP upland recharge areas toward San Francisco Bay. In Parcel C, groundwater flows uniformly towards the Bay, except for disturbances that may be caused by preferential flow along subsurface utilities. Groundwater elevations in Parcel C typically range from 0 to 10 feet above mean sea level (msl).

Natural heterogeneities and anthropogenic features have created preferential groundwater pathways in the A-Aquifer. The natural heterogeneities consist of stratigraphic discontinuities and facies changes. The anthropogenic features are comprised of heterogeneous pockets of artificial fill and an extensive system of buried utilities. Building foundations and dry docks can also influence groundwater migration.

Groundwater elevations in the A-Aquifer are also influenced by tidal fluctuations that create a sinusoidal pressure wave near the shoreline. However, tidal influence in the A-Aquifer decreases with increasing distance from the shoreline. Four tides occur daily with tidal periods being approximately six hours. At HPS, the mean tide range (calculated as the difference in height of mean high water and mean low water) is approximately 5 feet. A Tidally-Influenced Zone has been defined for the A-Aquifer, where tides cause groundwater elevations to fluctuate by 0.1 foot or more. The width of the Tidally Influenced Zone varies from approximately 75 feet to 500 feet along the shoreline. The Tidal Mixing Zone is defined as the area where A-Aquifer groundwater mixes with San Francisco Bay water. The Tidal Mixing Zone is assumed to be narrower than the Tidally-Influenced Zone, but has not been fully delineated.

Local anomalies in groundwater elevation can be caused by the interaction of subsurface utilities (i.e., sanitary sewer, storm sewer, and water supply lines) with the regional groundwater regime. Backfill material located along the subsurface utilities can serve as preferential pathways for groundwater flow, when submerged below the water table. Depending on location and depth, the backfill materials can either discharge or receive groundwater.

B-Aquifer

In Parcel C, groundwater elevations in monitoring wells in the semi-confined B-Aquifer can be up to several feet higher than in nearby A-Aquifer monitoring wells. The Bay Mud Aquitard thins and becomes discontinuous in the northeast portion of Parcel C, and the difference in groundwater elevations between the two aquifers is less distinct.

2.5 Summary of Previous Investigations and Remedial Actions

The following is a summary of information provided in the Feasibility Study Report for Parcel C (SulTech 2008). A list of historical investigations in Parcel C is provided in Table 2-3 of the FS report for Parcel C. Prior soil investigations in Parcel C have detected concentrations of metals, volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), PAHs, and

PCBs. Additionally, evidence of low-level radioactivity has been detected as described in the Historical Radiological Assessment (DON RASO 2004)

In 1984, environmental investigations began as part of the Preliminary Assessment in the area later designated as Parcel C. These investigations included record searches, on-line surveys, interviews, and limited field investigations.

Further investigations were performed as part of the Site Inspection in 1994. These investigations included geophysical surveys of suspected subsurface fuel lines; collection of soil and groundwater samples from boreholes; installation of monitoring wells and collection of groundwater samples; collection of shallow soil samples; trenching, mapping, inspection, and sample collection from the steam lines and sanitary sewers; video surveys of the sanitary sewers; and sump and floor scrape sampling.

As part of the Remedial Investigation between 1993 and 1997, environmental investigations were performed to further assess site conditions. These environmental investigations included literature searches; interviews with former on-site employees; geophysical, radiological, and aerial map surveys; installation of soil boreholes and monitoring wells; aquifer testing; indoor air testing; and storm drain inspection.

In 2002, a Groundwater Data Gaps Investigation was performed in Parcel C. The investigation included installing monitoring wells; collecting groundwater samples from both new and existing monitoring wells; measuring groundwater levels in monitoring wells; aquifer testing; and tidal influence and mixing studies.

Past remedial actions implemented at Parcel C are listed in Table 2-4 and described in the Feasibility Study Report for Parcel C (SulTech 2008).

3.0 Regulatory Framework

The following section presents the project regulatory framework.

3.1 Principal Decision Makers

Ongoing base closure work at HPS is overseen by the Navy's BRAC Program Management Office West, in San Diego, California. As the lead agency under Executive Order 12580, the Navy has authority over evaluation of risk, remedy selection, and overall public participation at HPS. The Navy is coordinating with the U.S. EPA, DTSC, and the RWQCB. The Navy, U.S. EPA, DTSC, and RWQCB representatives are collectively referred to as the BRAC Cleanup Team (BCT) for HPS.

3.2 Technical or Regulatory Standards

This data investigation is being conducted under the auspices of a Federal Facilities Agreement that provides a procedural framework and schedule for the CERCLA cleanup process at HPS. Activities are performed in accordance with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan.

3.3 Permitting Requirements

In accordance with Section 121(e) of CERCLA 1980 [CERCLA, 42 United States Code, Section 9621(e)], as amended, which states that no federal, state, or local permits shall be required for the portion of any removal or remedial action conducted entirely onsite, the work activities to be conducted do not require permits. Although formal permits are not required, substantive compliance with applicable requirements will be met.

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4.0 Technical Approach

The objective of this investigation is to assess the lateral extent of contaminants of concern under certain buildings in Parcel C. Contaminants of concern include copper, PAHs and selected SVOCs, naphthalene, manganese, mercury, organic lead, Aroclor 1260, lead, TPH (purgeables and extractables), and BTEX.

The technical approach, including sampling design and procedures, is presented in detail in Worksheet #17 of the SAP. In summary, field work activities may consist of the following:

- Mobilization
- Site reconnaissance to assess the current condition of the areas to be investigated
- Air monitoring during sampling using a photoionization detector for detection of hazardous and toxic vapors
- Soil borehole advancement and soil sampling using hand tools
- Sampling of investigation-derived waste (IDW)
- Laboratory analysis of soil, solid waste, and water samples
- Demobilization

4.1 Preparatory Activities

Prior to beginning field work, the following preparatory activities will take place:

- The U.S. Navy Remedial Project Manager (RPM), Resident Officer in Charge of Construction (ROICC) and the appropriate HPS security and fire department personnel will be notified regarding the anticipated work.
- Sampling personnel will review the appropriate sections of the SAP attached to this Work Plan and sign the project sign-off sheet.
- Affected personnel will read the Accident Prevention Plan and associated Site-Specific Safety and Health Plan and sign an acknowledgement form. They will also attend required HPS Radiation Awareness Training conducted by Tetra Tech EC before field activities commence.
- Underground Service Alert will also be notified at least two full working days in advance of any excavation/drilling/coring activity. Additionally, the investigation area will be geophysically surveyed to identify potential obstructions or utilities at borehole locations and borehole locations will be modified as necessary.

- Mobilization activities will include site preparation, movement of equipment and materials to the site, and orientation of field personnel. Upon receipt of appropriate authorizations, site personnel will be mobilized to the site.

4.2 Soil Boreholes

Fourteen (14) initial boreholes will be advanced at locations shown in Figure 10-3 through Figure 10-6 of the SAP in accordance with the procedures detailed in the SAP. Prior to advancing boreholes, concrete will be cored at each sample location with a concrete coring machine. Up to 22 additional step-out boreholes may be advanced, pending analysis of samples collected from the initial 14 boreholes. KCH will review the analytical data and assess where step-out borings are warranted based upon the decision criteria presented in Appendix B. Step out sampling will be initiated after approval of locations and sample analytes is received from the Navy.

4.3 Soil Sampling

SAP Worksheet #17 describes procedures to be used for collecting grab soil samples from the boreholes advanced below designated buildings. Samples will be collected by driving a stainless steel 2 inch by 6 inch tube into the ground using a slide hammer type sampler.

Analytes were provided to KCH in the scope of work for this CTO and subsequent discussions with the Navy and regulatory agencies. Analytical methods were presented in the SAP, which is included as Appendix A. Analytical methods were selected to provide data of the necessary quality to meet the Data Quality Objectives (DQOs) for this project as described in the SAP.

Sampling locations are presented in Figures 10-3 through 10-6. Sample analytes and analytical methods are presented in WS#18 of the attached SAP.

Samples will be properly labeled, stored, and transported to the analytical laboratory under chain-of-custody control in accordance with the SAP.

Agriculture and Priority Pollutants Laboratory, Inc. (APPL) is the selected analytical laboratory for this project. APPL is located in Clovis, California and will perform the soil analyses as specified in the SAP.

APPL meets the requirements of the National Environmental Laboratory Accreditation Program, the State of California Environmental Laboratory Accreditation Program, the Naval Facilities Engineering Service Center, and the latest version of the Department of Defense Quality Systems Manual.

The primary functions of a sampling and analysis program are to obtain accurate, representative environmental samples and to provide defensive analytical data. A program for evaluating field and laboratory data is developed to achieve these goals. The quality of field data will be assessed through regular collection and analysis of field QC samples. Laboratory QC samples will also be analyzed in accordance with referenced analytical method protocols to ensure that laboratory procedures are conducted properly and that the quality of the data is known. The SAP describes the types of QC samples to be collected and analyzed for this project and their role in ensuring that the project data are acceptable.

4.4 Borehole Decommissioning

SAP Worksheet #17 details the procedure for decommissioning the boreholes. Each borehole location will be grouted to the surface using a combination of bentonite and Portland cement.

4.5 Investigation-Derived Waste

Soil cuttings, decontamination water, personal protective equipment and associated waste generated during this project will be stored in Department of Transportation approved 55-gallon drums to be screened for radiation and disposed of in accordance with HPS site protocols. SAP Worksheet #17 provides details of waste disposal requirements and procedures.

KCH will coordinate the disposal of IDW with the Navy's transportation and disposal (T&D) contractor. Drums containing IDW will be labeled, sampled, and left inside each of the four buildings in an accessible location until chemical analysis for waste disposal profiling has been completed. KCH will coordinate disposal with the Navy's T&D contractor. It is assumed that the Navy will sign waste manifests.

4.6 Location Surveying

Each borehole location will be surveyed by a professional land surveyor, licensed by the State of California. The surveyor will provide the elevation at backfilled ground surface for each borehole location to a precision of 0.01 foot and its location to a precision of plus or minus 0.1 foot horizontally, based on the borehole center. The elevations will be surveyed relative to the 1929 National Geodetic Vertical Datum. The borehole locations will be surveyed using the 1927 North American Datum State Plane Coordinate System, California, Zone 3. Vertical coordinates will be reported as feet relative to mean sea level.

4.7 Safety and Health

Field activities for this project will be performed in accordance with the *Accident Prevention Plan for Data Gap Investigation of Soil Under Buildings on Parcel C* and associated Site-Specific Safety and Health Plan (KCH 2009). Radiation training and monitoring of personnel, tools, material, equipment, and IDW will be conducted by Tetra Tech EC in accordance with a project-specific work instruction. This will include directing requirements for site access/egress and tools, materials, equipment, storage and associated decontamination.

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5.0 Reporting

The results of the site characterization will be reported in a Technical Memorandum reviewed and signed by a California-licensed Professional Geologist. The Technical Memorandum will include:

- Descriptions of field activities and methodologies used.
- Summary of initial and step-out locations sampled
- Analytical data and associated validation reports.

Analytical results from this investigation will be incorporated into the ROD for Parcel C.

Electronic data will be uploaded in Naval Electronic Data Deliverable (NEDD) format into the Naval Installation Restoration Information Solution (NIRIS).

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6.0 References

CE2 Corporation, 2005. *Final Work Plan for Contamination Delineation at Remedial Unit C5.* November

Department of the Navy Base Realignment and Closure Program Management Office West, 2009. *Internal Draft Record of Decision for Parcel C Hunters Point Shipyard San Francisco, California.* March.

KCH, 2009. *Accident and Prevention Plan for Data Gap Investigation of Soil Under Buildings on Parcel C– Hunters Point Shipyard, San Francisco, California.* August.

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Appendix A

Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) for Data Gap Investigation of Soil Under Buildings on Parcel C

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SAP Worksheet #1 – Title and Approval Page

Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) for Data Gaps Investigation of Soil Under Buildings on Parcel C

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Date

Approval Signature: ______________________ 12/15/2009
Narciso Ancog
Navy Quality Assurance Officer
Date

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Table of Contents

Acronyms and Abbreviations

%R	percent recovery
AA	atomic absorption
ANSI/ASQ	American National Standards Institute/American Society for Quality
APPL	Agriculture and Priority Pollutants Laboratories, Inc.
BEC	Base Environmental Coordinator
BGS	below ground surface
BRAC	Base Realignment And Closure
BTEX	benzene, toluene, ethylbenzene and xylenes (total)
°C	degrees Celsius
CA	Corrective Action
CAP	Corrective Action Program
CAR	Corrective Action Report
CAS	Chemical Abstract System
CCC	continuing calibration compounds
CCV	continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CO	(Navy) Contracting Officer
COC	chain-of-custody
DOT	Department of Transportation
DQI	data quality indicator
DQO	data quality objective
DHS	(California) Department of Health Services
DTSC	(California) Department of Toxic Substances Control
ECD	electron capture detector
EDD	electronic data deliverable
EDV	Environmental Data Validation, Inc.
EICP	Extracted Ion Current Profile
FS	Feasibility Study
GC / MS	gas chromatography / mass spectroscopy
HPS	Hunters Point Shipyard
IC	ion chromatography
ICAL	initial calibration standard
ICP	inductively-coupled plasma
ICV	initial calibration verification
IDQTF	Intergovernmental Data Quality Task Force
IDW	investigation-derived waste
IR	Installation Restoration (Program)
JV	(CH2M HILL Kleinfelder) Joint Venture
KCH	CH2M HILL Kleinfelder Joint Venture
LCS	laboratory control sample
LL	low-level
LUFT	Leaking Underground Fuel Tank
MB	method blank
MD	matrix duplicate

Acronyms and Abbreviations (continued)

MDL	method detection limit
μg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
MS	matrix spike
MSD	matrix spike duplicate
Navy	United States Department of the Navy
NEDD	Naval Electronic Data Deliverable
NELAP	National Environmental Laboratory Accreditation Program
NAVFAC Southwest	Naval Facilities Engineering Command, Southwest
NAVFAC ESC	Naval Facilities Engineering Command / Engineering Service Center
NIRIS	Naval Installation Restoration Information System
NPL	National Priorities List
PAL	project action limit
PAHs	polycyclic aromatic hydrocarbons
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
%R	percent recovery
PPE	personal protection equipment
PPS	Petroleum Program Strategy
PSC	Preliminary Screening Criteria
PQLG	project quantitation limit goal
PT	proficiency testing
QA	quality assurance
QAM	Quality Assurance Manager
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	quality control
QCSR	Quality Control Summary Report
QL	quantitation limit
r	correlation coefficient
RD	Remedial Design
RF	response factor
ROD	Record of Decision
RPD	relative percent difference
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RSD	relative standard deviation
SAP	Sampling and Analysis Plan
SDG	sample delivery group
SIM	Selective Ion Monitoring
SOP	standard operating procedure
SPCC	single-point calibration compounds
SSHP	Site-specific Safety and Health Plan

Acronyms and Abbreviations (continued)

SVOCs	semivolatile organic compounds
TBD	To be Determined
TPH-e	total extractable petroleum hydrocarbons
TSA	Technical Systems Audit
UFP	Uniform Federal Policy
UFP-QS	Uniform Federal Policy for Implementing Quality Systems
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound
Water Board	(California) Regional Water Quality Control Board
WS	Worksheet

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Executive Summary

This document presents the Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) (hereafter referred to as the "SAP") for Data Gaps Investigation of Soil Under Buildings on Parcel C, Hunters Point Shipyard (HPS) located in San Francisco, California.

The U.S. Department of the Navy (Navy) has prepared the Proposed Plan and forthcoming Draft Record of Decision (ROD). The ROD identifies the selected remedy for remediation at Parcel C, Hunters Point Shipyard. In order to complete the Draft Final ROD for Parcel C, the Navy needs to determine the extent of contamination under the foundations of buildings 134, 203, 214 and 231.

I. Study Goals

The goals of the Study are:

1. Fill ROD Data Gaps

Prior to completing the Draft Final ROD, the Navy needs to complete a data gaps investigation in shallow soils beneath specific buildings in Parcel C, to determine the extent of contamination.

The Study is needed to provide additional data to address the following question:

- Are target analytes present at concentrations above Parcel C ROD Remediation Goals? If so, how will this affect the RD?

2. Provide Data for TPH CAP

Additional data are needed to support the HPS Total Petroleum Hydrocarbon Corrective Action Program (TPH CAP).

The Study is needed to provide additional data to address the following question:

- Are target analytes present at concentrations above Tier 1 Screening Criteria? If so, how will this affect the TPH CAP?

Worksheets (WS) #10 and #11 define the problems being studied and the data quality objectives (DQOs) for this project, respectively. WS #17 describes the rationale and process for selecting the analytical methods and sampling locations, and the procedures to be utilized to collect the data.

The scope of work consists of the following:

- Hand-auger boreholes at 13 primary borehole locations.

- Advance one borehole using truck-mounted 8-inch slant-drive augers

- Collect between one and six soil samples from each borehole using a manually-advanced slide hammer (and possibly with a California split-spoon sampler for the one auger-advanced borehole).

- Submit soil samples for laboratory analysis of multiple organic and inorganic target analytes.

- Compare soil sample analytical results to Project Action Limits (PALs) that are the either ROD-specified Remediation Goals, and/or TPH CAP-related Tier 1 Screening Criteria.

- Advance additional "step-out" boreholes and collect soil samples for laboratory analysis, based on the results of the primary samples, at the direction of the Navy.

- Prepare a Technical Memorandum discussing the procedures and findings.

II. Organization of the SAP

This SAP is organized according to the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) (U.S. EPA, 2005). The UFP-QAPP is the outcome of the Intergovernmental Data Quality Task Force (IDQTF). It is the companion to the Uniform Federal Policy for Implementing Environmental Quality Systems (UFP-QS). The UFP-QS was developed to consistently implement the quality system requirements of ANSI/ASQ (American National Standards Institute/American Society for Quality) E4-2004 Quality Systems for Environmental Data and Technology Programs (ANSI, 2004).

The UFP-QAPP and this SAP consist of 37 worksheets. A list of the worksheets is provided in the Table of Contents and Table 2-1.

SAP Worksheet #2 -- SAP Identifying Information

Site Name/Number: Hunters Point Shipyard (HPS)
Operable Unit: Not applicable. No operable units have been assigned at HPS.
Contractor Name: CH2M HILL Kleinfelder Joint Venture (KCH)
Contract Number: N62473-09-D-2622
Contract Title: Data Gaps Investigation of Soil Under Buildings on Parcel C, Hunters Point Shipyard, San Francisco, California
Work Assignment Number: Contract no. N62473-09-D-2622 Contract Task Order CTO003

1. This SAP was prepared in accordance with the requirements of the *Uniform Federal Policy for Quality Assurance Plans (UFP-QAPP)* (United States Environmental Protection Agency ([U.S. EPA], 2005), *EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5, QAMS* (U.S. EPA, 2002), and Draft Final Naval Facilities Engineering Command (NAVFAC) Specific UFP-SAP Template.

2. Identify regulatory program:

   Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

3. This SAP is a project-specific SAP.

4. List dates of scoping sessions that were held:

   No formal scoping sessions were held for this project. The informal scoping for this project was carried out prior to work assignment to KCH. The scope was included in the Scope of Work assigned to KCH (Navy, 2009), and was subsequently revised at the direction of the Navy to provide data for the TPH CAP.

5. List dates and titles of any SAP documents written for previous site work that are relevant to the current investigation:

   Previous site work relevant to the current investigation is presented in the Parcel C Final Feasibility Study Report (Sultech, 2008), which references the SAPs listed below.

Title	Date
TetraTech, 2004b. "Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) Basewide Groundwater Monitoring Program, Hunters Point Shipyard, San Francisco, California."	8/20/2004
TetraTech and Washington Group International, 2001. "Final Sampling and Analysis Plan, Parcel C Soil Delineation, Hunters Point Shipyard, San Francisco, California."	1/18/2001

6. Organizational partners (stakeholders) and connection with lead organization:

   The stakeholders include the public, U.S. EPA, California Department of Toxic Substances Control (DTSC), California Regional Water Quality Control Board (Water Board), and the City of San Francisco. The regulatory agencies, the City of San Francisco, and the public oversee the cleanup process, which is being conducted by the U.S. Department of the Navy (Navy).

7. Lead organization:

   The lead organization for the project is the Navy. The Navy uses the information gathered to make decisions in conjunction with the stakeholders.

8. If any required SAP elements or required information are not applicable to the project or are provided elsewhere, then note the omitted SAP elements and provide an explanation for their exclusion below:

   Worksheet #8: No special personnel training will be required for this project. However, routine training is listed on this worksheet.

   Worksheet #9: No formal scoping sessions were held in the development of this updated SAP. The informal scoping for this project was carried out prior to work assignment to KCH. The scope was included in the Scope of Work assigned to KCH (Navy, 2009), and was subsequently revised at the direction of the Navy to provide data for the TPH CAP.

Table 2-1. UFP-QAPP crosswalk.

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
A. Project Management		
Documentation		
1	Title and Approval Page	
2	Table of Contents SAP Identifying Information	
3	Distribution List	
4	Project Personnel Sign-Off Sheet	
Project Organization		
5	Project Organizational Chart	
6	Communication Pathways	
7	Personnel Responsibilities and Qualifications Table	
8	Special Personnel Training Requirements Table	No special personnel training will be required for this project. However, routine training is listed.
Project Planning/ Problem Definition		
9	Project Planning Session Documentation (including Data Needs tables) Project Scoping Session Participants Sheet	Not applicable. No formal scoping sessions were held in the development of this SAP. The informal scoping for this project was carried out prior to work assignment to KCH. The scope was included in the Scope of Work assigned to KCH (Navy, 2009), and was subsequently revised at the direction of the Navy to provide data for the TPH CAP.
10	Problem Definition, Site History, and Background. Site Maps (historical and present)	
11	Site-Specific Project Quality Objectives	
12	Measurement Performance Criteria Table	
13	Sources of Secondary Data and Information Secondary Data Criteria and Limitations Table	
14	Summary of Project Tasks	
15	Reference Limits and Evaluation Table	
16	Project Schedule/Timeline Table	
B. Measurement Data Acquisition		
Sampling Tasks		
17	Sampling Design and Rationale	
18	Sampling Locations and Methods/ SOP Requirements Table Sample Location Map(s)	

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
19	Analytical Methods/SOP Requirements Table	
20	Field Quality Control Sample Summary Table	
21	Project Sampling SOP References Table Sampling SOPs	
22	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	Not applicable; no equipment needing calibration will be used for field measurements.
Analytical Tasks		
23	Analytical SOPs Analytical SOP References Table	
24	Analytical Instrument Calibration Table	
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	
Sample Collection		
26	Sample Handling System, Documentation Collection, Tracking, Archiving and Disposal Sample Handling Flow Diagram	
27	Sample Custody Requirements, Procedures/SOPs Sample Container Identification Example Chain-of-Custody (COC) Form and Seal	
Quality Control Samples		
28	QC Samples Table Screening/Confirmatory Analysis Decision Tree	
Data Management Tasks		
29	Project Documents and Records Table	
30	Analytical Services Table Analytical and Data Management SOPs	
C. Assessment Oversight		
31	Planned Project Assessments Table Audit Checklists	
32	Assessment Findings and Corrective Action Responses Table	
33	QA Management Reports Table	
D. Data Review		
34	Verification (Step I) Process Table	
35	Validation (Steps IIa and IIb) Process Table	
36	Analytical Data Validation (Steps IIa and IIb) Summary Table	
37	Usability Assessment	

SAP Worksheet #3 -- Distribution List

Name of SAP Recipients	Title/Role	Organization	Telephone Number	E-mail Address or Mailing Address	Document Control Number (Optional)
Sarah Koppel	Remedial Project Manager (RPM)	U.S. Navy Naval Facilities Engineering Command, Southwest (NAVFAC Southwest)	(619) 532- 0962	sarah.koppel@navy.mil Department of the Navy Base Realignment and Closure Project Management Office West 1455 Frazee Road, Suite 900 San Diego, CA 92108	
Narciso Ancog	Quality Assurance Officer (QAO)	NAVFAC Southwest	(619) 532-3046	narciso.ancog@navy.mil	
Mark Ripperda	Project Manager	U.S. Environmental Protection Agency (U.S. EPA)	(415) 972-3028	Ripperda.mark@epa.gov U.S. Environmental Protection Agency Region IX 75 Hawthorne Street San Francisco, CA 94105-3901	
Ryan Miya	Project Manager	California Department of Toxic Substances Control (DTSC)	(510) 540-3775	RMiya@dtsc.ca.gov Department of Toxic Substances Control 700 Heinz Avenue, Bldg. F, Suite 200 Berkeley, CA 94710-2721	
Ross Steenson	Project Manager	California Regional Water Quality Control Board (Water Board)	(510) 622-2445	RSteenson@waterboardsca.gov California Regional Water Quality Control Board San Francisco Bay Region 1515 Clay Street, Suite 1400 Oakland, CA 94612	

Name of SAP Recipients	Title/Role	Organization	Telephone Number	E-mail Address or Mailing Address	Document Control Number (Optional)
Dana Sakamoto	Program Manager	CH2M HILL Kleinfelder JV	(619) 687-0116	dana.sakamoto@ch2m.com	
Gary Goodemote	Task Order Manager	CH2M HILL Kleinfelder JV	(858) 320-2000	ggoodemote@kleinfelder.com	
Leslie Lundgren	Team Manager	CH2M HILL Kleinfelder JV	(415) 541-7220	leslie.lundgren@ch2m.com	
Stacie Wissler	Program Quality Assurance Manager (QAM)	CH2M HILL Kleinfelder JV	(858) 320-2000	swissler@kleinfelder.com	
Mohammad Abri	Project Quality Assurance Officer (QAO)	CH2M HILL Kleinfelder JV	(925) 373-9606	mabri@ce2corp.com	
Patricia Walters	Project Chemist	CH2M HILL Kleinfelder JV	(510) 628-9000	pwalters@kleinfelder.com	
Gerald Kellar	Data Manager	CH2M HILL Kleinfelder JV	(858) 320-2000	gkellar@kleinfelder.com	
Diane Anderson	Analytical Laboratory Project Manager	Agriculture and Priority Pollutants Laboratory, Inc. (APPL)	(559) 275-2175	danderson@applinc.com	
Steve Lane	Analytical Laboratory Director	Calscience Environmental Laboratories, Inc. (Calscience)	(714) 895-5494	slane@calsscience.com	
Maxine Walters	Analytical Data Validation Principal Chemist	Environmental Data Validation, Inc. (EDV)	(412) 341-5281	mwalters@edv-inc.com	
Gabe Fuson	Field Manager	CH2M HILL Kleinfelder JV	(510) 628-9000	gfuson@kleinfelder.com	
Dan Eldridge	Site Safety Manager	CH2M HILL Kleinfelder JV	(408) 586-7611	deldredge@kleinfelder.com	

SAP Worksheet #4 -- Project Personnel Sign-Off Sheet

Name	Organization/Title/Role	Telephone Number (optional)	Signature/email receipt	SAP Section Reviewed	Date SAP Read
Sarah Koppel	Navy / RPM	(619) 532- 0962			
Dana Sakamoto	CH2M HILL Kleinfelder JV / Program Manager	(619) 687-0116			
Leslie Lundgren	Team Manager	(619) 687-0116			
Mohammad Abri	CH2M HILL Kleinfelder JV / Project QAO	(925) 373-9606			
Patricia Walters	CH2M HILL Kleinfelder JV / Project Chemist	(510) 628-9000			
Gerald Kellar	CH2M HILL Kleinfelder JV / Data Manager	(858) 320-2000			
Diane Anderson	APPL / Project Manager	(559) 275-2175			
Steve Lane	Calscience Environmental Laboratories, Inc.	(714) 895-5494			
Maxine Walters	Data Validation Subcontractor	(412) 341-5281			
Gabe Fuson	CH2M HILL Kleinfelder JV / Field Manager	(510) 628-9000			
To Be Determined	CH2M HILL Kleinfelder JV / Sampling personnel	Not applicable			

Notes:

The sampling personnel read the appropriate sections of this document before performing activities related to this SAP. The completed Worksheet is maintained in the CH2M HILL Kleinfelder JV project file.

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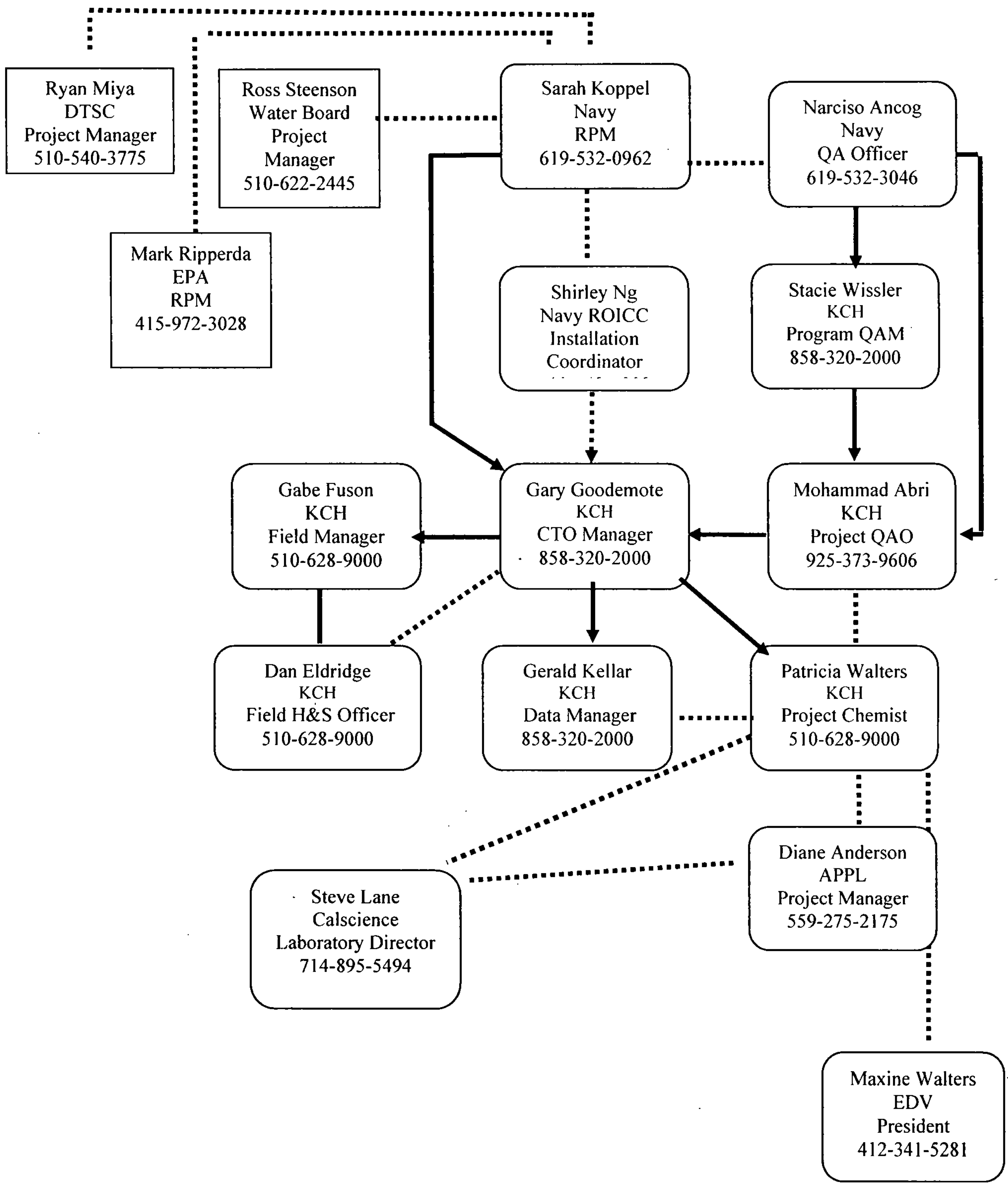
SAP Worksheet #5 -- Project Organizational Chart

Lines of Authority ———— ·········· Lines of Communication



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SAP Worksheet #6 -- Communication Pathways

Communication Drivers	Responsible Affiliation	Name	Phone Number and/or e-mail	Procedure (timing, pathway to & from, etc.)
Authorization for KCH to initiate field work	Remedial Project Manager (RPM) U.S. Navy Naval Facilities Engineering Command, Southwest (Navy)	Sarah Koppel	(619) 532- 0962	KCH Program Manager communicates either verbally or by e-mail of earliest schedule possible for field work to commence. Navy RPM provides KCH Program Manager with written instruction to proceed, upon completing coordination with Contracting Officer (CO).
U.S. EPA point of contact with Navy RPM	U.S. EPA	Mark Ripperda	(415) 972-3028	Reports and other project-related information are submitted by the Navy Base Environmental Coordinator (BEC) for review and comments by the agency.
DTSC point of contact with Navy RPM	DTSC	Ryan Miya	(510) 540-3775	Reports and other project-related information are submitted by the Navy Base Environmental Coordinator (BEC) for review and comments by the agency.
Water Board point of contact with Navy RPM	Water Board	Ross Steenson	(510) 622-2445	Reports and other project-related information are submitted by the Navy Base Environmental Coordinator (BEC) for review and comments by the agency.
KCH point of contact with Navy RPM	CTO Manager KCH	Gary Goodemote	(858) 320-2000	Materials and information about the project are forwarded to the Navy RPM by the Program Manager.
KCH point of contact with Navy QAO	Program QAM KCH	Stacie Wissler	(858) 320-2000	Quality related materials and information about the project are forwarded to the QAO by the Program QAM.
SAP amendments	Program QAM KCH	Stacie Wissler	(858) 320-2000	Any changes to the SAP are submitted in writing to the Navy QAO, who must approve the changes prior to implementation.

Communication Drivers	Responsible Affiliation	Name	Phone Number and/or e-mail	Procedure (timing, pathway to & from, etc.)
SAP amendment approvals	Navy QAO	Narciso Ancog	(619) 532-3046	Issues final approval of SAP amendments to Program QAM via signed approval form (portable document format [pdf] is acceptable). Review time frame is typically 10 business days, but approval time frame is dependent on degree of edits being made.
Revising sampling program (adding or removing sampling location or revising analytical suite)	CTO Manager KCH	Gary Goodemote	(858) 320-2000	CTO Manager reviews previous data and evaluates need for revisions. Notifies Field Manager by phone and email of changes at least 2 days prior to field implementation.
Field or analytical corrective actions	Program QAM KCH	Stacie Wissler	(858) 320-2000	The need for corrective actions is assessed by the Program QAM, who notifies the Project QAO by phone or email, within 2 business days. Project QAO notifies Project Manager and Field Manager (field issues) or Project Chemist (analytical issues) by phone or email within 2 business days.
Field implementation of SAP changes	CTO Manager KCH	Gary Goodemote	(858) 320-2000	CTO Manager notifies Field Manager by phone and email of changes at least 2 days prior to field implementation.
Release of soil sampling field data for use in the Technical Memorandum	Field Manager KCH	Gabe Fuson	(510) 628-9000	Soil sampling field data are reviewed by the Field Manager, and are transmitted by email or hard-copy shipping to the CTO Manager.
Field deviations from the SAP	Field Manager KCH	Gabe Fuson	(510) 628-9000	Field Manager notifies CTO Manager by phone or email within 2 days of the SAP deviation (nature of deviation and technical justification).
Analytical deviations from the SAP, or reporting analytical data quality issues.	Agriculture & Priority Pollutants Laboratories, Inc. (subcontractor)	Diane Anderson	(559) 275-2175	Laboratory notifies Project Chemist by phone or email, and documents SAP deviations in the validated data report.

Communication Drivers	Responsible Affiliation	Name	Phone Number and/or e-mail	Procedure (timing, pathway to & from, etc.)
Analytical data validation issues	Data Validation Subcontractor	Maxine Walters	(412) 341-5281	Analytical data validation firm notifies Project Chemist within 2 business days and documents issues in the data validation report.
Release of analytical data to KCH	Project Chemist / Data Manager KCH	Patricia Walters / Gerald Kellar	(510) 628-9000 (858) 320-2000	No analytical data can be released until validated analytical data are approved by the Project Chemist.
Technical Memorandum submittal to regulatory agencies	RPM Navy	Sarah Koppel	(619) 532- 0962	Navy RPM receives Technical Memorandum from KCH and submits them to U.S. EPA, DTSC, and Water Board though Navy BEC. Navy RPM also provides copies as appropriate to other Navy contractors.
Response to regulatory comments	RPM Navy	Sarah Koppel	(619) 532- 0962	Navy RPM receives regulatory comments on submitted Technical Memorandum via the Navy BEC and coordinates responses with KCH as necessary.

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SAP Worksheet #7 -- Personnel Responsibilities and Qualifications Table

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
Sarah Koppel	RPM	Navy	• Performs project management. • Oversees the project cost and schedule. • Provides overall direction for project. • Provides authorization for work to be performed. • Acts as liaison with regulatory agencies, including submittal of documents. • Acts as liaison with other Navy departments.	
Shirley Ng	Navy Resident Officer In Charge Of Construction (ROICC)	Navy	• Oversees protocols for disposition of investigation-derived waste (IDW)	
Narciso Ancog	Navy QAO	Navy	• Provides governmental oversight of the project Quality Assurance (QA) Program. • Provides quality-related directives through Contracting Officer Representative. • Provides technical and administrative oversight of surveillance audit activities. • Acts as point of contact for matters concerning QA and the Navy's Laboratory QA Program. • Prepares governmental budget estimates for QA functions included in contracts. • Coordinates training on matters pertaining to generation and maintenance of quality of data. • Authorizes the suspension of project execution if QA requirements are not adequately followed.	
Richard Cavil	Program Safety and Health Manager	KCH	• Oversees preparation of company safety programs and compliance. • Reviews Site-specific Safety and Health Plan (SSHP). • Acts a liaison between CTO Manager and project-specific safety personnel.	

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
Dana Sakamoto	Program Manager	KCH	• Issues and authorizes Appointment Letters describing duties/responsibilities and delegating authority. • Issues stand-down order when necessary. • Monitors and controls project through audits and surveillance of activities. • Interfaces directly with the Navy to maintain awareness in planning and scheduling.	
Gary Goodemote	CTO Manager	KCH	• Issues stand-down order when necessary. • Establishes an overall records management system. • Implements the approved project-specific plans. • Evaluates project-specific procedures and plans. • Evaluates the project schedule and budget.	
Stacie Wissler	Program QAM	KCH	• Serves as a point of contact for the Navy QAO. • Reviews and approves QA/QC plans and revisions. • Periodically evaluates the effectiveness of the QA/QC plans through conducting surveillances, audits, or management assessments. • Assigns, directs, and supports the QA/QC staff. • Trains, qualifies, and evaluates the personnel according to the QA/QC plans. • Reviews project-specific SAPs as required. • Directs QA audits. • Reviews field deviations from the SAP.	
Dan Eldridge	Site Safety Officer	KCH	• Implements SSHP. Ensures onsite personnel have required training and attend daily safety meetings. • Is lead for identifying, communicating, and, as appropriate, addressing corrective actions for encountered hazards not initially addressed in the Site-specific Safety and Health Plan. • Communicates and reports health and safety issues to Program Health and Safety Manager	
Gabe Fuson	Field Manager	KCH	• Directs field operations. • Reviews field sampling data. • Prepares field deviations from the SAP.	

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
Mohammad Abri	Project QAO	KCH	• Liaison between Program QAM and Field Manager to maintain proper implementation of field-related QAPP requirements. • Performs Technical Systems Audit of field activities or assigns qualified designee. • Implements analytical data QC procedures. • Evaluates whether project specifications have been met. • Supports Technical Memorandum preparation. • Audits field and laboratory performance as required. • Evaluates and selects qualified subcontract analytical laboratories and analytical data validation companies. • Provides technical support to Project Chemist and Data Manager.	
Patricia Walters	Project Chemist	KCH	• Participates in development of project-specific SAP. • Implements contract requirements for analytical data collection. • Implements analytical data QC procedures. • Reviews analytical data prior to use. • Coordinates analytical data validation of analytical data. • Reviews analytical data validation reports. • Supports Technical Memorandum preparation and assesses whether project specifications have been met.	
Gerald Kellar	Data Manager	KCH	• Imports sample and analytical data into a database system. • Provides sample and analytical data for Technical Memorandum production. • Transmits validated analytical data to the Navy via the Naval Installation Restoration Information Solution (NIRIS).	
Diane Anderson	Laboratory Project Manager	APPL	• Oversees analytical laboratory analyses and data reporting (primary laboratory).	
Steve Lane	Laboratory Director	Calscience Environmental Laboratories, Inc.	• Oversees analytical laboratory analyses and data reporting (back-up laboratory).	
Maxine Walters	Analytical data validation / Principal Chemist	EDV	• Oversees validation of analytical data, preparation of analytical data validation reports, and EDD preparation with validation qualifiers.	

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SAP Worksheet #8 -- Special Personnel Training Requirements Table

No special personnel training will be required for this project. The following are the routine training requirements for the sampling personnel.

Project Function	Specialized Training By Title or Description of Course	Training Provider	Training Date	Personnel / Groups Receiving Training	Personnel Titles / Organizational Affiliation	Location of Training Records / Certificates
Sampling	Title 29 CFR OSHA, 40-hour, initial [1]	External contracted provider	Before starting field work	Sampling Personnel	Sampling personnel / KCH	Field Office
Sampling	Title 29 CFR OSHA, 8-hour annual refresher, continuing [1]	In-house training	Annually	Sampling Personnel	Sampling personnel / KCH	Field Office
Sampling	Multimedia First Aid and CPR or equivalent [1,2]	Red Cross or an on-line training provider	Before starting field work and bi-annual refresher	Sampling Personnel	Sampling personnel / KCH	Field Office
Sampling	HPS Radiation Awareness Training	Navy's radiation contractor	Before starting field work	Sampling Personnel	Sampling personnel / KCH	Field Office
Sampling	Sampling Operations [1]	Field Manager and/or Field Team Lead	On the job training	Sampling Personnel	Sampling personnel / KCH	Field Office

Notes:

1 This is routine training.
2 At least one member of every field team will maintain a current certification.

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SAP Worksheet #9 -- Project Scoping Session Participants Sheet

Not applicable. No formal scoping sessions were held in the development of this updated SAP. The informal scoping for this project was carried out prior to work assignment to KCH. The scope was included in the Scope of Work assigned to KCH (Navy, 2009), and was subsequently revised at the direction of the Navy to provide data for the TPH CAP.

Not Applicable

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SAP Worksheet #10 -- Problem Definition

This worksheet presents a site description summary and Step 1 of the U.S. EPA's data quality objective (DQO) process. Steps 2 through 7 are presented in Worksheet (WS) #11.

Site Description and Background

HPS is located in the southern part of San Francisco, California, adjacent to the San Francisco Bay (see Figure 10-1). HPS is situated on a promontory that extends into San Francisco Bay. HPS consists of approximately 425 acres of land along the shoreline. Onshore, HPS includes nine contiguous geographic parcels (i.e., Parcels B, C, D-1, D-2, G, UC-1, UC-2, E, and E-2). Parcel F is the submerged portion of HPS.

In 1989, the U.S. EPA placed HPS on its National Priorities List (NPL). The Navy Installation Restoration (IR) Program performs remediation activities at historical disposal sites, including such sites located at HPS. HPS was selected in 1991 as one of the military installations to be closed under the Base Realignment and Closure (BRAC) process. Site characterization and remedial activities have been conducted at HPS since 1984.

Parcel C includes approximately 78 acres of shoreline and lowland coast along the east-central portion of HPS (see Figure 10-2). The Remedial Investigation (RI) for Parcel C was completed in 1997. Parcel C currently is in the Feasibility Study (FS) stage in the CERCLA remedial process. Draft and Draft Final FS Reports were developed in 1997 and 1998, respectively. Following the 1998 Draft Final FS Report, the Navy and the regulatory agencies conducted a risk management review that refined the areas for proposed response action. The Navy then conducted an interim removal action and a groundwater data gaps investigation. A Final FS Report was completed in July 2008 (SulTech, 2008), which updates the 1998 Draft Final FS Report and includes additional information collected during the subsequent remedial activities. A forthcoming draft Record of Decision (ROD) has been prepared for Parcel C (Navy, 2009).

The focus of this SAP is a data gaps investigation at various locations within four buildings within Parcel C (see Figures 10-3 through 10-6). Shallow soil samples, from approximately 0.5 to 10 feet below ground surface (BGS), see WS #18, will be collected and analyzed for various constituents of concern beneath Buildings 134, 203, 214 and 231.

Historically, these buildings were used as follows:

- Building 134 housed offices, machine shops, a refrigeration repair shop, an industrial quality and reliability assurance laboratory, and storage facilities.
- Building 203 housed a power plant and boiler room through 1974.
- Building 214 was used as an office building.
- Building 231 was used for heavy industrial machining. The building housed several air treatment systems, sumps, sandblasting rooms, and a boiler. For

purposes of this investigation, the Navy has conceptually divided Building 231 into two portions: Building 231E (eastern portion) and Building 231W (western portion). Investigation activities will be undertaken only in the Building 231E portion, and all references herein to "Building 231" as regards investigation activities relate to the eastern portion of the building.

Conceptual Site Model

The Parcel C RI and FS reports present a conceptual site model that includes: site history; site characterization; geologic and hydrogeologic characteristics; and risk assessment factors (including contaminant exposure pathways). The following summarizes key elements of the conceptual site model, specific to Parcel C, that are relevant to this SAP. Figure 10-7, from the forthcoming Draft Parcel C ROD, depicts the conceptual site model.

The study area consists of level lowlands that were constructed by placing borrow fill material from various sources, including crushed serpentinite bedrock from HPS upland area, construction debris, and waste materials. Surface elevations in the Study Area are between approximately 8-12 feet above mean sea level. Depth to bedrock may be as shallow as approximately 3 feet BGS.

Shallowest groundwater (A-Aquifer) is present at between approximately 5-10 feet below BGS. Groundwater in the A-Aquifer is not currently used for any purpose at Parcel C, and is not suitable as a potential drinking water resource.

Parcel C ecology is limited to those plant and animal species adapted to the industrial environment. All Study Areas (where sampling is to occur) are inside buildings with concrete slab floors. No threatened or endangered species are known to inhabit Parcel C or its immediate vicinity.

Although Parcel C underground fuel and steam lines were removed or closed in 2002, the storm drain and sanitary sewer lines beneath the parcel (scheduled for removal in 2010) remain. Drilling locations will be surveyed before sampling to identify potential buried utility lines and other subsurface structures.

DQO Step 1. State the problem:

The Navy has determined that a data gap investigation is needed in order to complete the Draft Final ROD for Parcel C, and to provide additional data for the TPH CAP. The planned data gap investigation consists of collecting and analyzing relatively shallow soil samples, from approximately 0.5 to 10 feet BGS, beneath Buildings 134, 203, 214 and 231, see WS #18.

The investigation is needed to obtain additional data in order to address the following questions:

- Are target analytes present at concentrations above Parcel C ROD Remediation Goals (see WS#15 for list)? If so, how will this affect the Draft Final ROD for Parcel C?

- Are target analytes present at concentrations above Tier 1 Screening Criteria (see WS#15 for list)? If so, how will this affect the TPH CAP?

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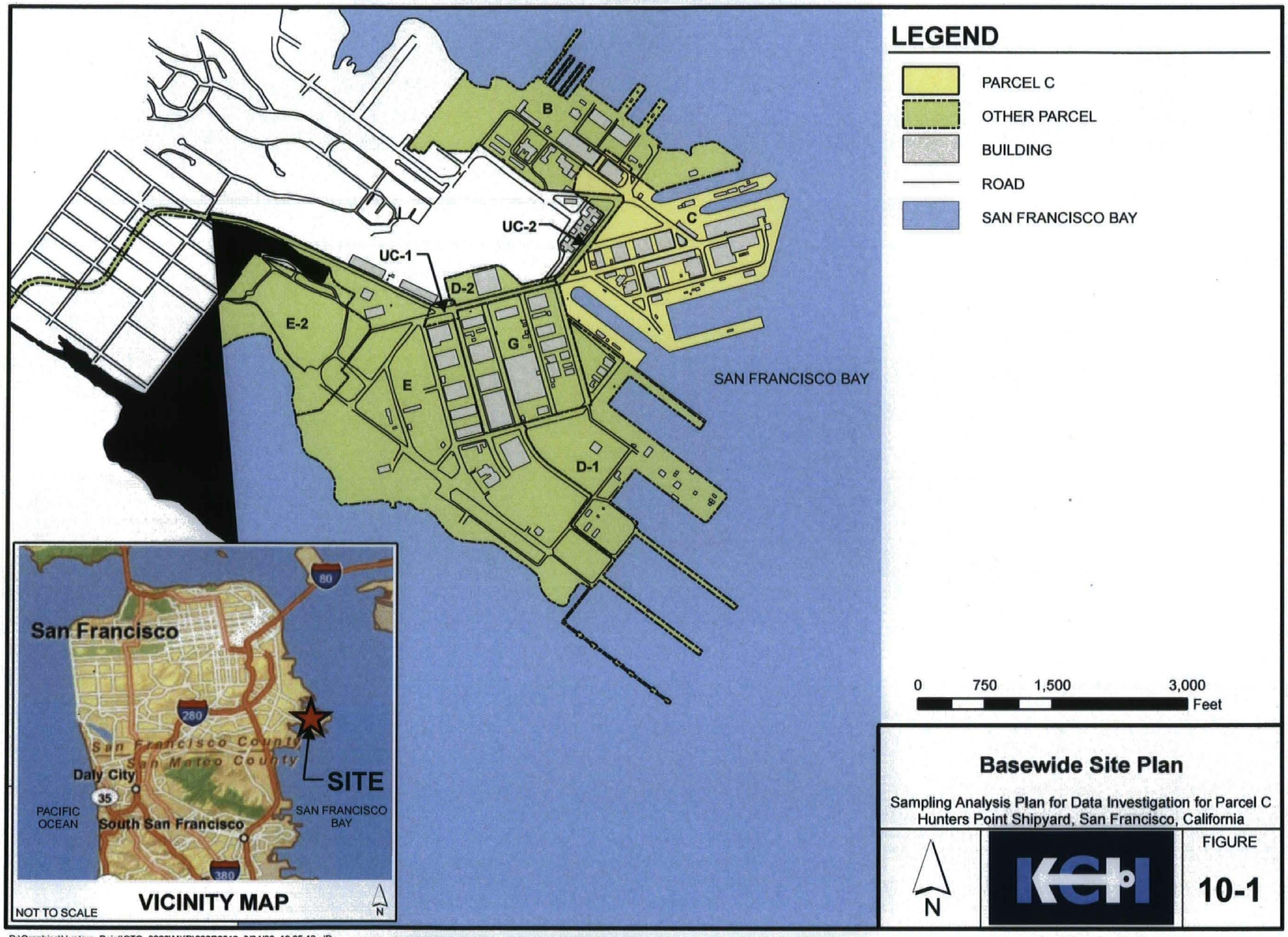


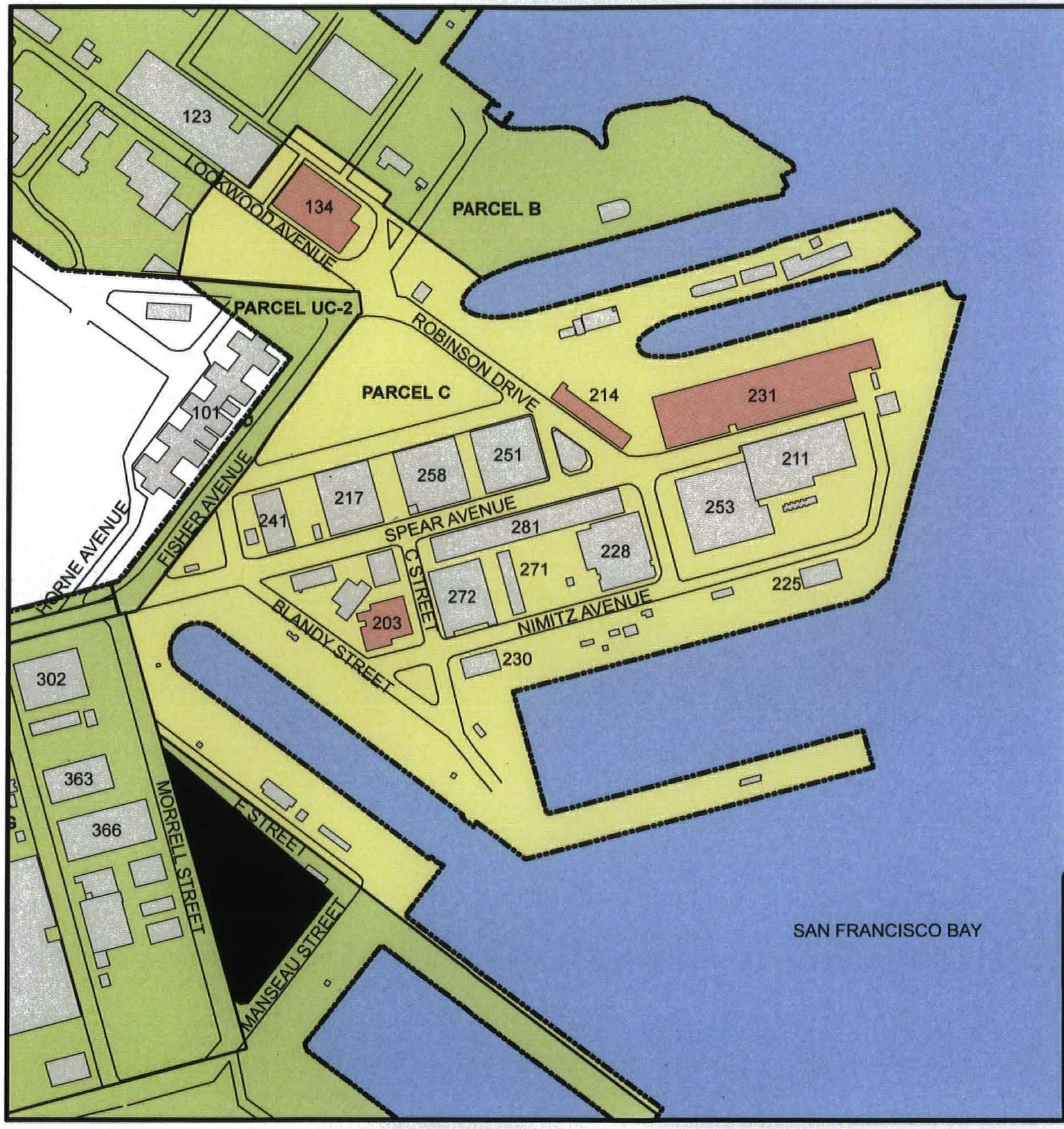
Basewide Site Plan

Sampling Analysis Plan for Data Investigation for Parcel C
Hunters Point Shipyard, San Francisco, California

FIGURE
10-1

D:\Graphics\Hunters_Point\CTO_0003\MXD\003R0012 8/24/09 16:35:12 JP

003L0011.MXD 12/3/09 JP San Diego



LEGEND

- PARCEL C
- OTHER PARCEL
- BUILDING
- BUILDING THAT IS PART OF THIS INVESTIGATION
- ROAD
- SAN FRANCISCO BAY
- BASE BOUNDARY

0 250 500 1,000 Feet

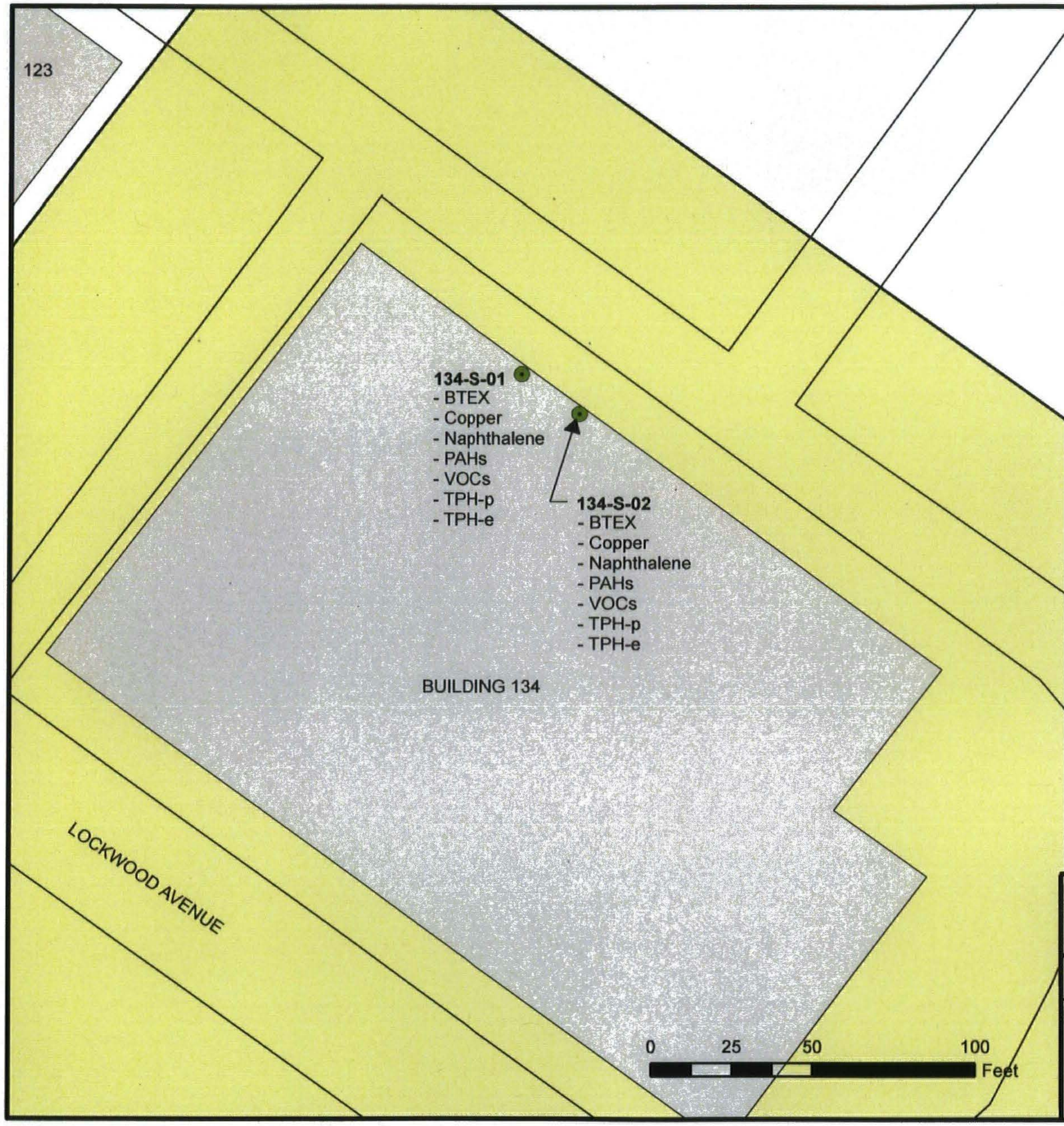
N

Site Plan
Parcel C

Sampling Analysis Plan for Data Investigation for Parcel C
Hunters Point Shipyard, San Francisco, California

KCH

FIGURE **10-2**



LEGEND

- PROPOSED SOIL SAMPLING LOCATION, SHOWING STATION ID AND PROPOSED ANALYSES
- PARCEL C
- BUILDING
- ROAD

NOTES:

BTEX - Benzene, Toluene, Ethylbenzene, total Xylenes
PAH - Polycyclic Aromatic Hydrocarbon
VOC - Volatile Organic Compound
TPH-e - Total Petroleum Hydrocarbons, extractables
TPH-p - Total Petroleum Hydrocarbons, purgeables

Four (4) step out locations to be determined

REFERENCE:

See Appendix B, Table E-2 for additional background information

Proposed Soil Sampling Locations Building 134

Sampling Analysis Plan for Data Investigation for Parcel C
Hunters Point Shipyard, San Francisco, California

N

KCH

FIGURE **10-3**

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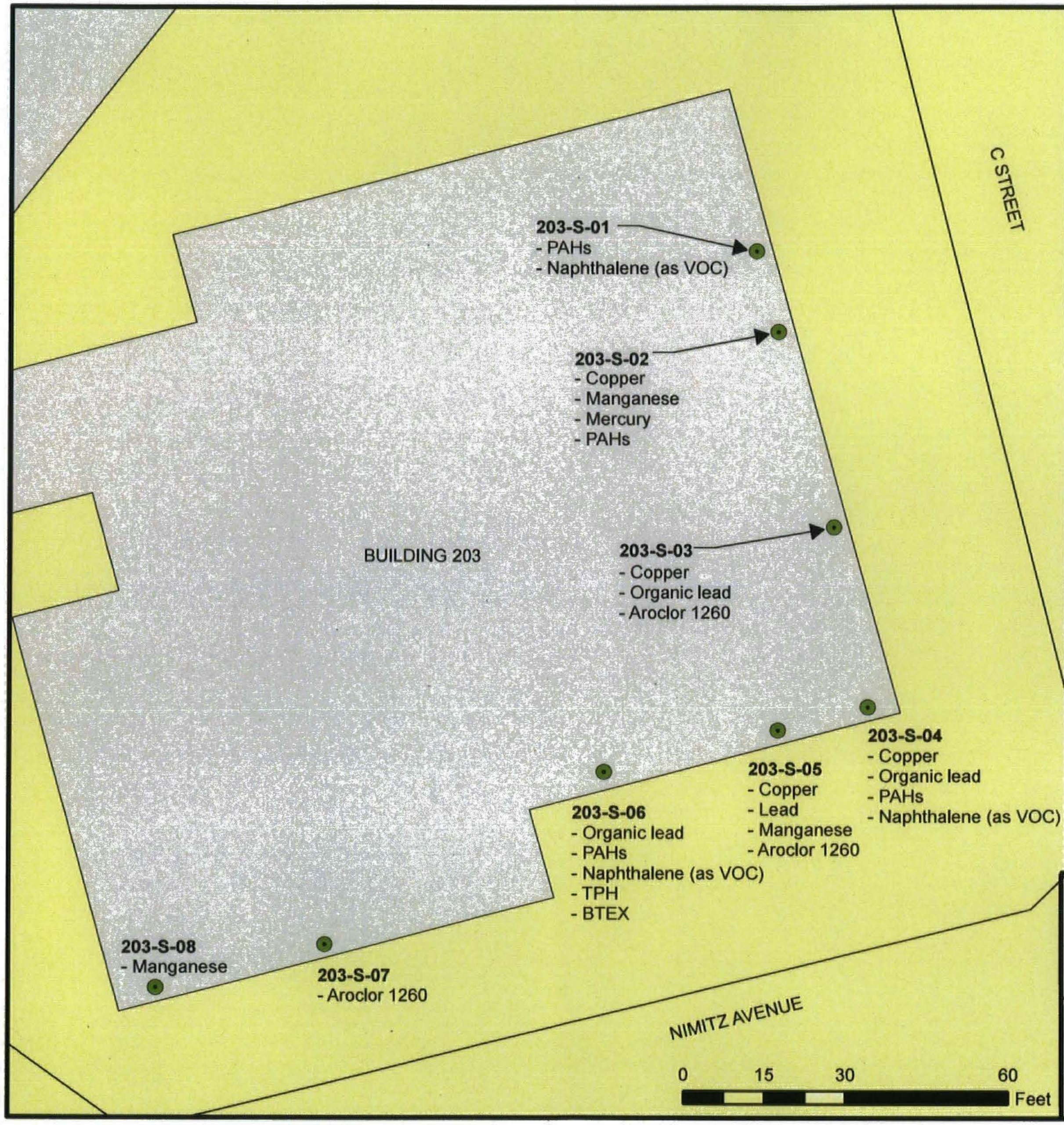
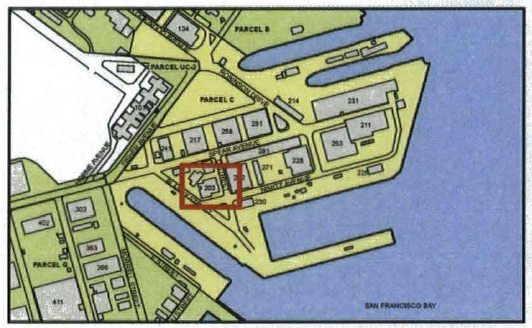




LEGEND

PROPOSED SOIL SAMPLING LOCATION, SHOWING STATION ID AND PROPOSED ANALYSES

PARCEL C

BUILDING

ROAD

NOTES:

BTEX - Benzene, Toluene, Ethylbenzene, total Xylenes
PAH - Polycyclic Aromatic Hydrocarbon
TPH - Total Petroleum Hydrocarbon
VOC - Volatile Organic Compound

Optional step out locations to be determined

REFERENCE:

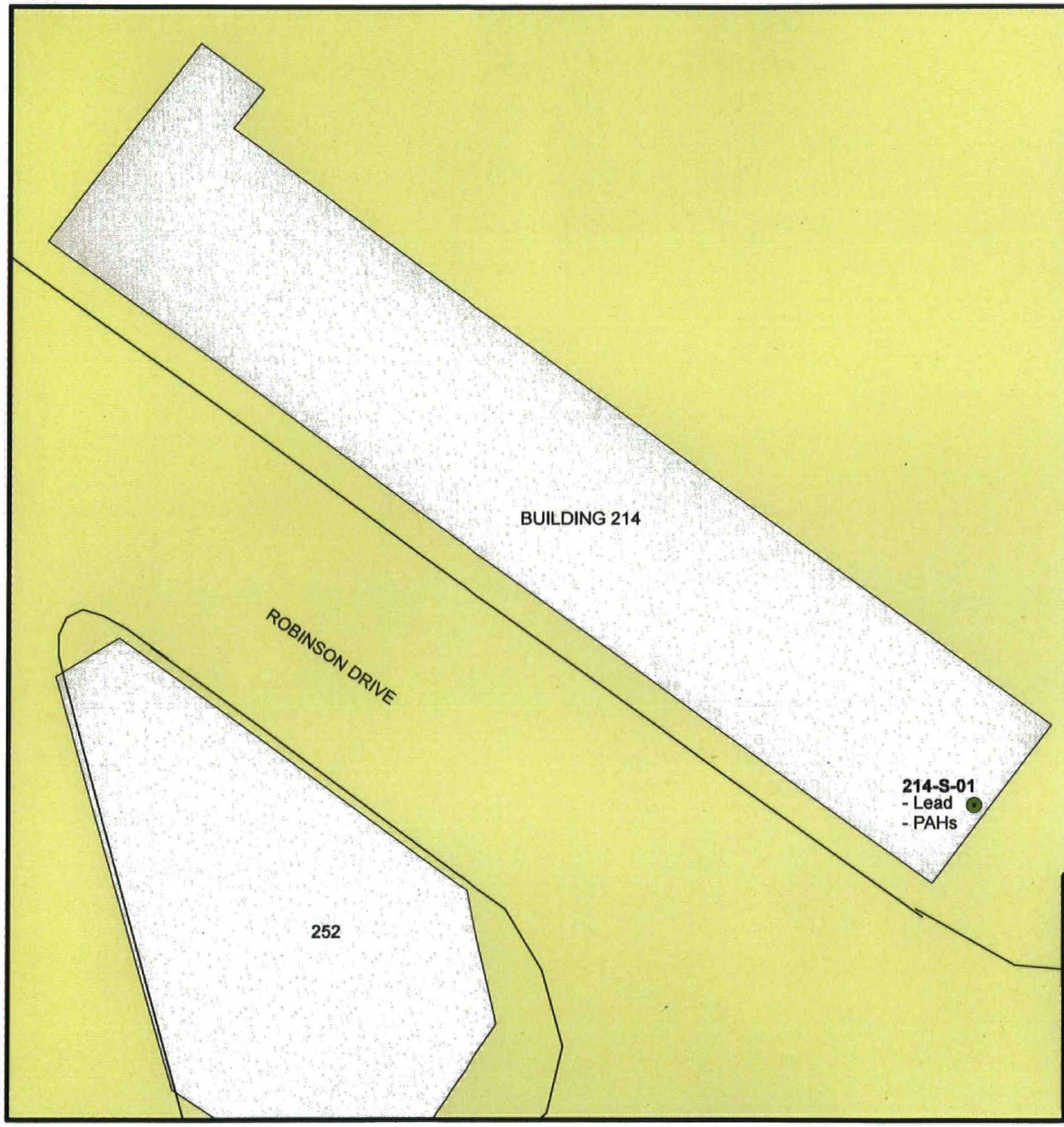
See Appendix B, Table E-2 for additional background information

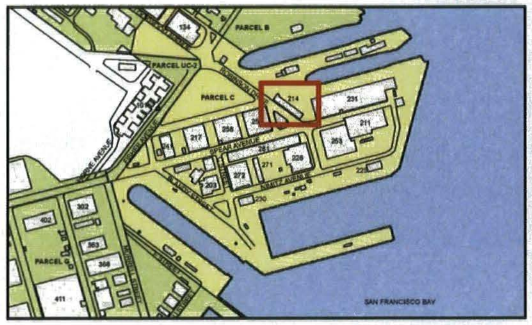
Proposed Soil Sampling Locations
Building 203

Sampling Analysis Plan for Data Investigation for Parcel C
Hunters Point Shipyard, San Francisco, California

N

FIGURE
10-4





LEGEND

- PROPOSED SOIL SAMPLING LOCATION, SHOWING STATION ID AND PROPOSED ANALYSES
- PARCEL C
- BUILDING
- ROAD

NOTES:

PAH - Polycyclic Aromatic Hydrocarbon

Optional step out locations to be determined

REFERENCE:

See Appendix B, Table E-2 for additional background information

0 20 40 80 Feet

Proposed Soil Sampling Locations Building 214

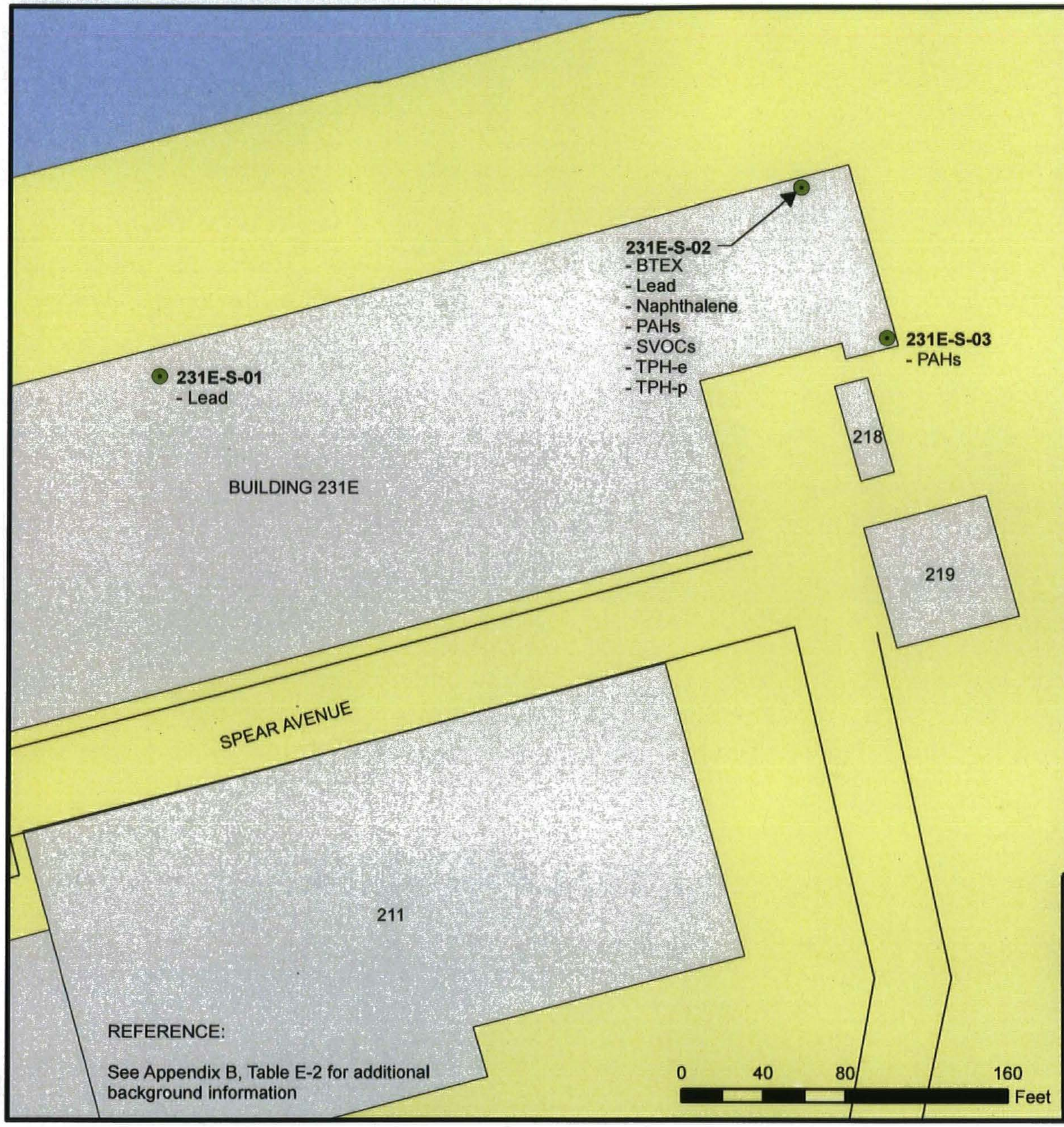
Sampling Analysis Plan for Data Investigation for Parcel C
Hunters Point Shipyard, San Francisco, California

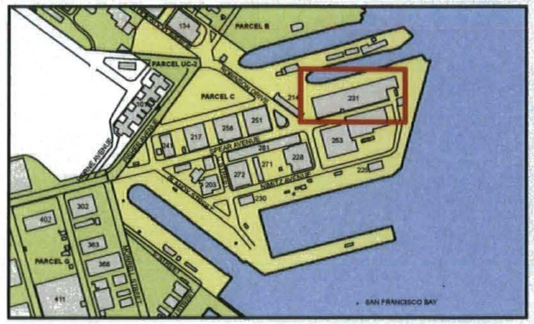
N

FIGURE

10-5

003S0007.MXD 12/3/09 JP San Diego





LEGEND

●	PROPOSED SOIL SAMPLING LOCATION, SHOWING STATION ID AND PROPOSED ANALYSES
	BUILDING
	ROAD
	WATER/SAN FRANCISCO BAY

NOTES:

BTEX - Benzene, Toluene, Ethylbenzene, total Xylenes
PAH - Polycyclic Aromatic Hydrocarbon
SVOC - Semi-Volatile Organic Compound
VOC - Volatile Organic Compound
TPH-e - Total Petroleum Hydrocarbons, extractables
TPH-p - Total Petroleum Hydrocarbons, purgeables

Optional step out locations to be determined

For the purpose of this investigation, the Navy has divided Building 231 into two portions: Building 231E (eastern portion) and Building 231W (western portion). Investigation activities will be undertaken only in the Building 231E portion

Proposed Soil Sampling Locations
Building 231E

Sampling Analysis Plan for Data Investigation for Parcel C
Hunters Point Shipyard, San Francisco, California

N

FIGURE **10-6**

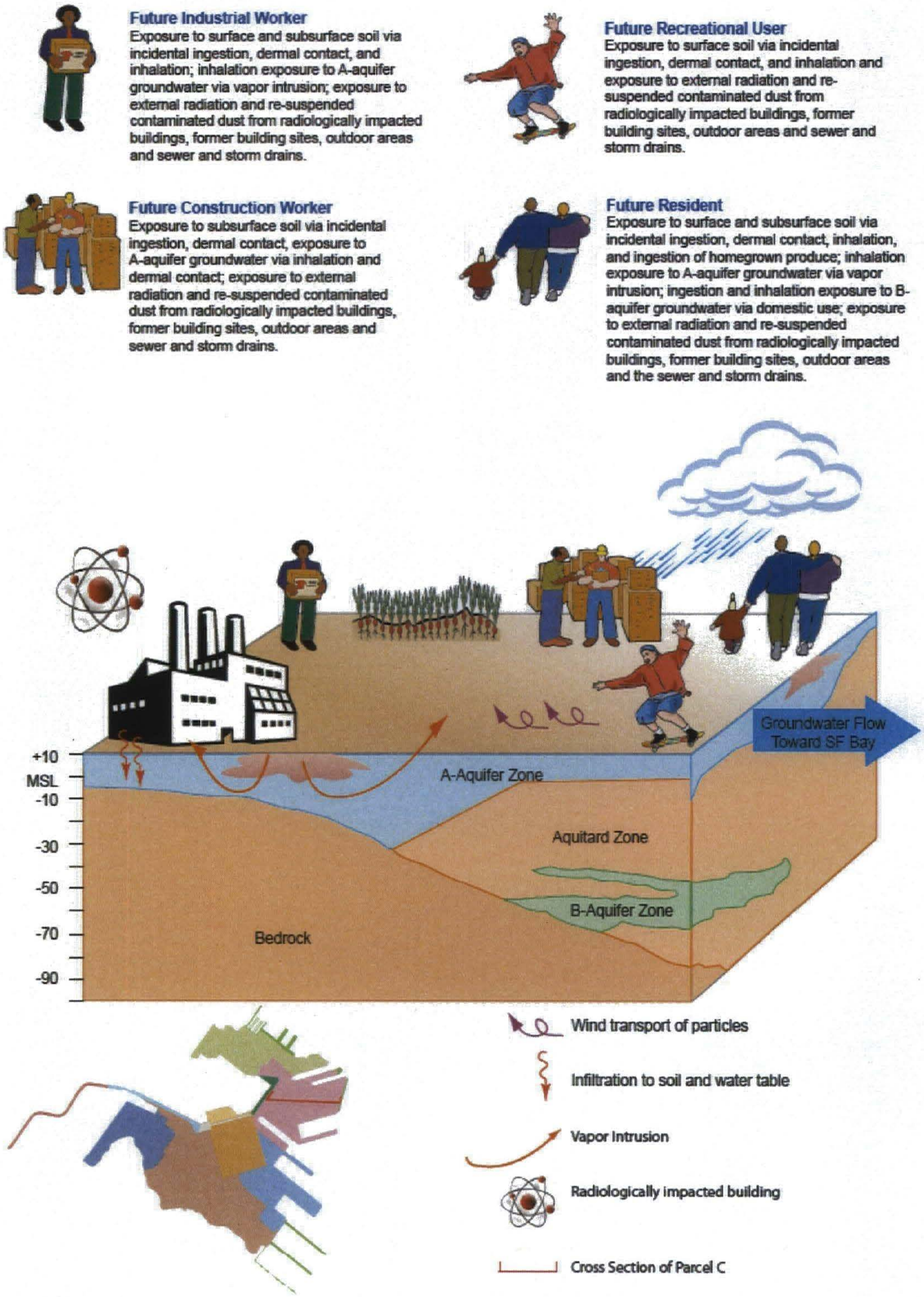


Figure is "Figure 9" from Internal Draft Record of Decision for Parcel C (Navy, 2007)

Figure 10-7

SAP Worksheet #11 – Project Quality Objectives/Systematic Planning Process Statements

This WS presents Steps 2 through 7 of U.S. EPA's DQO process.

DQO Step 2. Identify the Goals of the Study:

Goal 1: Fill ROD Data Gaps

Prior to the completion of the Draft Final ROD for Parcel C, the Navy needs to complete a data gap investigation of the soil under specific buildings on Parcel C to determine the extent of contamination. These data will provide necessary details for the completion of the Draft Parcel C ROD.

If target analytes are detected above the PALs (Parcel C ROD Remedial Goals), the data will be interpreted as an indication that the areas may have been impacted. Thus, the data will be used in the Draft Final ROD to better define the extent of excavation needed if building foundations are removed.

Goal 2: Provide Data for TPH CAP

Additional data are needed to support the HPS Total Petroleum Hydrocarbon Corrective Action Program (TPH CAP).

If target analytes are detected above the PALs (Tier 1 Screening Criteria), the data will be interpreted as an indication that the areas may have been impacted. Thus, the data will be used by the TPH CAP to determine if remediation and/or additional characterization is needed to address TPH impacts.

DQO Step 3. Identify the Information Inputs:

The information inputs used to accomplish the goal of the Study are:

- Analytical data from soil samples to be collected per WS #17 and #18 to be used in conjunction with previously-collected FS data (Sultech, 2008).
- Analytical data will be obtained by analyzing soil samples using US EPA methods outlined in WS #19. The reference limits are outlined in WS #15.

DQO Step 4. Define the Boundaries of the Study:

The lateral boundary of the Study includes four buildings within Parcel C: Building 134; Building 203; Building 214; and Building 231 (see Figures 10-3 through 10-6).

The vertical boundary is 10 feet below the top of concrete slab in each building (the lowest depth of soil samples to be collected).

The sampling for this project will begin in December 2009. The decisions as a result of the investigations will be used to complete the ROD for Parcel C and will last until the end of the remediation activities.

DQO Step 5. Develop the Analytic Approach:

The sampling and analysis tasks in this SAP have been designed to meet the goal of the Study.

The decision rules related to the Goals of the Study (DQO Step 2) are as follows.

Goal 1: Fill ROD Data Gaps

Soil samples will be collected to fill data gaps, as necessary, to complete the Draft Final ROD for Parcel C. WS #17 discusses, in detail, the Navy's rationale for selecting sampling locations, sample depths, and laboratory analytical methods for this Goal.

If target analyte concentrations are above PALs (Parcel C ROD Remedial Goals) (see WS#15 for PALs list), then: the data will be referred to decision-makers to complete the Draft Final ROD for Parcel C, and to better define the extent of remediation in the areas of the Study.

An action would not be required if the target analyte concentrations are below the PALs. The analytical results and conclusions would be documented in the ROD.

Goal 2: Provide Data for TPH CAP

Soil samples will be collected to provide additional data to support the TPH CAP. WS #17 discusses, in detail, the Navy's rationale for selecting sampling locations, sample depths, and laboratory analytical methods for this Goal.

If target analyte concentrations are above PALs (Tier 1 Screening Criteria) (see WS #15 for PALs list), then: the data will be referred to decision-makers to evaluate if remediation and/or additional site characterization is needed to address TPH impacts.

DQO Step 6. Specify the Performance or Acceptance Criteria:

To maximize data comparability and to minimize sampling error, soil sampling will be conducted using field sampling and processing methods as described in WS #17. For reproducibility and comparability of analytical data, standard U.S. EPA-approved analytical methods will be used, and laboratories that are accredited by the Department of Defense (DOD) Environmental Laboratory Accreditation Program (ELAP), National Environmental Laboratory Accreditation Program (NELAP), and California Department of Health Services (DHS) ELAP will be used.

The PALs for this Study are presented in WS #15. PALs have been established for each of the two sample types to be collected.

Field Soil Samples

The Navy will evaluate analytical results of field soil samples in the context of two sets of criteria:

1) Remediation Goals as listed in the forthcoming Draft ROD for Parcel C (Navy, 2009) and the Final FS Report (Sultech, 2008). When Remediation Goals are utilized as PALs, the values for residential exposure scenario were utilized (lowest values).

2) Tier 1 Screening Criteria for total petroleum hydrocarbons (TPH) and associated compounds, as listed in Table 1b of the HPS report, *Final New Preliminary Screening Criteria AND Petroleum Program Strategy* (Shaw, 2007). When Tier 1 Screening Criteria are utilized as PALs, the values used were: shallow soil (less than 10 feet BGS); residential land use scenario; drinking water resource.

Some target analytes have both Remediation Goals and Tier 1 Screening Criteria. In those cases, both PALs are listed.

The Navy's approach for selecting ROD Remediation Goals and evaluating analytical results, including criteria for selecting and sampling "step-out" boreholes, was presented and agreed upon in the May 2008 meeting regarding the Parcel C ROD.

Field QC Water Samples

Three types of field quality control (QC) water samples will be collected: trip blanks, equipment rinsate blanks (from decontamination of field sampling equipment), and source blanks (the water used to decontaminate field sampling equipment). The analytical results of these field QC water samples are used to monitor possible cross-contamination and assess the effectiveness of the decontamination process.

DQO Step 7. Develop the Plan for Obtaining Data:

The sampling has been designed to address gaps in the data for completion of the Draft Final ROD for Parcel C. The sampling design and rationale were specified in the Contract Task Order Scope of Work (Navy, 2009), and was subsequently revised at the direction of the Navy to provide data for the TPH CAP. The sampling design is judgmental.

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SAP Worksheet #12 -- Measurement Performance Criteria Table – Field QC Samples

QC Sample [1]	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Trip Blank	Benzene, toluene, ethylbenzene and total xylenes (BTEX) Methyl tert-butyl ether (MTBE) Naphthalene TPH purgeables	One per field team per cooler containing one or more volatile constituents (BTEX, MTBE, naphthalene, or TPH purgeable) samples per day	Accuracy/Bias Contamination	No target compounds ≥ quantitation limit (QL)	S
Equipment Rinsate Blank	Varies depending on the location where non-dedicated equipment was used, and field conditions encountered during sampling.	One per field team per set of non-dedicated equipment per day	Accuracy/Bias Contamination	No target compounds ≥ QL	S & A
Source Water Blank	Varies depending on the location where non-dedicated equipment was used, and field conditions encountered during sampling.	One per quarterly sampling event per source water used to decontaminate equipment	Accuracy/Bias Contamination	No target compounds ≥ QL	S
Field Duplicate	Field duplicate samples will not be collected due to the heterogeneity of the sample matrix.				

Notes:

1 Due to the range of analytical groups requested per sampling locations, equipment rinsate blank and source water blank analyses may vary. Selection of equipment rinsate blanks will target the most commonly requested analytical methods and/or field conditions encountered during sampling activities.

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SAP Worksheet #13 -- Secondary Data Criteria and Limitations Table

Secondary Data	Data Source	Data Generator	How Data Will be Used	Limitation on Data Use
Soil analytical data used in the Feasibility Study for Parcel C	SulTech, 2008. "Final Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California" July 31.	Navy	Data will be used in conjunction with the results of this investigation.	There are no limitations on secondary data use. The secondary data were generated following the applicable Navy protocols and requirements.

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SAP Worksheet #14 -- Summary of Project Tasks

Field Tasks

Preparatory Activities: Prior to beginning field work, the Navy RPM, Navy Resident Officer in Charge of Construction (ROICC), and appropriate HPS security and fire department personnel will be notified. Prior to conducting field activities, field personnel will review the applicable sections of the SAP, read the Site-Specific Health and Safety Plan, attend required HPS Radiation Awareness Training (as necessary for radiologically-impacted buildings) and sign the Project Personnel Sign-off Sheet (WS #4).

Mobilization: Mobilization activities will consist of site preparation, movement of equipment and materials to the site, orientation and training of field personnel (including any on-site safety training/orientation), and having sampling locations screened for subsurface utilities.

Soil Sampling: Soil sampling will be conducted in accordance with the procedures described in WS #17. Soil samples will be collected and submitted in accordance with U.S. EPA-approved analytical method requirements (i.e. sample volume, container type, preservative) as described in WS #19.

Equipment Decontamination: Decontamination will be performed on non-disposable, reusable equipment as described in WS #17. Radiation screening will be performed on personnel, equipment, and tools that are used in Navy-designated Radiation Control Areas (RCAs), in accordance with the protocols set forth by the Navy contractor in charge of performing radiation training and screening.

Investigation-derived waste (IDW) Management: IDW generated during field activities will include waste (excess) soil from sampling activities, water from equipment decontamination, and personnel protective equipment (e.g. gloves, Tyvek, etc.) WS #17 describes procedures for waste storage and labeling. Waste manifesting, transport, and disposal will be the responsibility of another designated Navy contractor.

Analysis Tasks: Soil and water samples, including QC samples, will be analyzed for one or more of the following: selected metals (copper, inorganic and organic lead, manganese, and mercury), BTEX, naphthalene, selected polycyclic aromatic hydrocarbons (PAHs)/semivolatile organic compounds (SVOCs), Aroclor 1260, TPH-extractables (i.e.,diesel and motor oil), TPH-purgeables (i.e., gasoline), and percent moisture. Soil and water samples for IDW (waste characterization) will be analyzed for metals (including mercury), polychlorinated biphenyls (PCBs), SVOCs, TPH-extractables, and TPH-purgeables.

Quality Control Tasks: Soil samples may be accompanied by the following field QC samples: trip blanks, equipment rinsate blanks, and source water blanks. As appropriate to the analytical method, the following laboratory QC analyses will be performed: initial calibrations, continuing calibrations, tuning, method blanks, laboratory control samples, matrix spikes, matrix spike duplicates, laboratory duplicates, surrogates, internal standards, and other applicable QC in accordance with the analytical method. See WS #20 and WS#28.

Secondary Data: No secondary data will be used in reporting results from the data gap investigation.

Data Management Tasks: Analytical data will be provided by the analytical laboratory in hard-copy format and in electronic data deliverables (EDDs). Validated analytical data will be compiled in the KCH database, upon completion of the analytical data validation process. Electronic and hard-copy laboratory reports will be archived for a minimum of 7 years. EDDs will be prepared in the Naval Electronic Data Deliverable (NEDD) format after verification, validation, and peer review. The NEDDs will be submitted to the Naval Installation Restoration Information Solution (NIRIS) database within 30 days after completion of the peer review of the validated analytical data.

Documentation and Records: Chain-of-custody records will be prepared and submitted with samples that are submitted to the analytical laboratory. See WS #29.

Assessment/Audit Tasks: A soil sampling Technical Systems Audit (TSA) will be conducted once during the field investigation (see WS #31). A Quality Control Summary Report (QCSR) will be prepared and submitted as an attachment to the Technical Memorandum. Deviations from the SAP will be discussed in the QCSR.

Data Review Tasks: Each laboratory performing sample analyses will verify that data are complete and correct for samples submitted for analysis. Analytical data will be validated by a third-party analytical data validation subcontractor to assess whether the quality of the analytical data is adequate for the intended use(s), as defined by the precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) parameters in this SAP. Analytical data usability will be assessed upon review of analytical data validation reports and field documentation in a QCSR that will be included in the Technical Memorandum. The QCSR will include a discussion of data limitations and a comparison against the DQOs. Analytical data will be presented in tables and figures. Analytical data for target analytes will be compared to the PALs.

Data Validation: One hundred percent of the analytical data will be subject to a data quality assessment (i.e., review, verification, validation, and usability assessment), with approximately 80 percent of the Level III analytical data undergoing data validation and 20 percent of the Level IV analytical data undergoing validation. Analytical data validation will be conducted by a third-party data validation subcontractor. Validated data will be reviewed and evaluated during the usability assessment.

Reports: The final data and description of sampling activities will be reported in a Technical Memorandum, consisting of text, figures, analytical data tables, certified analytical laboratory reports and supporting sampling forms, and the QCSR. Any deviations from the requirements in this SAP will be documented in the QCSR.

SAP Worksheet #15 -- Reference Limits and Evaluation Table

The following worksheets are grouped into the following categories:

- WS #15a through #15f: Field soil samples
- WS #15g through #15l: Field QC water samples
- WS #1m through #15r: IDW water samples
- WS #1s through #15x: IDW soil samples

SAP Worksheet #15a -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Volatile Organic Compounds – U.S. EPA 8260B

(This portion of the WS is applicable to field soil samples.)

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference [1]	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
Benzene	71-43-2	4.9 180	Tier 1 Screening Criteria ROD Remediation Goals	3.0	2.0	0.63
Ethylbenzene	100-41-4	9,400	Tier 1 Screening Criteria	100	5.0	0.64
Methyl *tert*-butyl ether (MTBE)	1634-04-4	29,000	Tier 1 Screening Criteria	100	5.0	0.89
Naphthalene	91-20-3	19 1,700	Tier 1 Screening Criteria ROD Remediation Goals	10	5.0	0.41
Toluene	108-88-3	29,000	Tier 1 screening Criteria	100	5.0	0.19
Xylenes (total)	1330-20-7	4,800	Tier 1 Screening Criteria	200	10.0	0.68

SAP Worksheet #15b -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Polycyclic Aromatic Hydrocarbons and Semivolatile Organic Compounds – U.S. EPA 8270DSIM

(This portion of the WS is applicable to field soil samples.)

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference [1]	Project Quantitation Limit Goal (µg/kg)		
					QLs (µg/kg)	MDLs (µg/kg)
Acenaphthene	83-32-9	520,000	Tier 1 Screening Criteria	100	5.0	0.97
Acenaphthylene	208-96-8	25,000	Tier 1 Screening Criteria	100	5.0	0.89
Anthracene	120-12-7	230,000	Tier 1 Screening Criteria	100	5.0	0.83
Benzo(a)anthracene	56-55-3	370 380	ROD Remediation Goals Tier 1 Screening Criteria	100	5.0	0.91
Benzo(b)fluoranthene	205-99-2	340 380	ROD Remediation Goals Tier 1 Screening Criteria	100	5.0	1.11
Benzo(k)fluoranthene	207-08-9	340 380	ROD Remediation Goals Tier 1 Screening Criteria	100	5.0	1.04
Benzo(a)pyrene	50-32-8	38 330	Tier 1 Screening Criteria ROD Remediation Goals	15	5.0	0.93
Benzo(g,h,i)perylene	191-24-2	340,000	Tier 1 Screening Criteria	100	5.0	1.34
Bis(2-ethylhexyl) phthalate [4]	117-81-7	1,100	ROD Remediation Goals	100	660	61.6
Chrysene	218-01-9	3,300 14,000	ROD Remediation Goals Tier 1 Screening Criteria	100	5.0	0.85
Dibenz(a,h)anthracene	53-70-3	330	ROD Remediation Goals	100	5.0	0.92
1,4-Dichlorobenzene [4]	106-46-7	2,000	ROD Remediation Goals	100	330	48.9
3,3'-Dichlorobenzidine [4]	91-94-1	1,600	ROD Remediation Goals	100	660	56.3
Fluoranthene	206-44-0	100,000	Tier 1 Screening Criteria	100	5.0	1.20
Fluorene	86-73-7	14,0000	Tier 1 Screening Criteria	100	5.0	1.00
Indeno(1,2,3-c,d)pyrene	193-39-5	350 620	ROD Remediation Goals Tier 1 Screening Criteria	100	5.0	0.90

Analyte	CAS Number	Project Action Limit (μg/kg)	Project Action Limit Reference [1]	Project Quantitation Limit Goal (μg/kg)		
					QLs (μg/kg)	MDLs (μg/kg)
1-Methylnaphthalene	1321-94-4	580 [3]	Tier 1 Screening Criteria	100	5.0	0.90
2-Methylnaphthalene	91-57-6	580 [3]	Tier 1 Screening Criteria ROD Remediation Goals	100	5.0	0.94
Naphthalene	91-20-3	19 1,700	Tier 1 Screening Criteria ROD Remediation Goals	100	5.0	0.89
n-Nitrosodi-n-propylamine [4]	621-64-7	330	ROD Remediation Goals	100	330	54.9
Phenanthrene	85-01-8	140,000	Tier 1 Screening Criteria	100	5.0	1.10
Pyrene	129-00-0	730,000	Tier 1 Screening Criteria	100	5.0	1.24

SAP Worksheet #15c -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Metals – U.S. EPA 6010C / DHS LUFT / U.S. EPA 7471B

(This portion of the WS is applicable to field soil samples.)

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Action Limit Reference [1]	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					QLs (mg/kg)	MDLs (mg/kg)
Copper	7440-50-8	160	ROD Remediation Goals	1.5	0.5	0.09
Lead (total)	7439-92-1	155	ROD Remediation Goals	1.5	0.5	0.09
Organic Lead	ORG PB	0.5	ROD Remediation Goals	0.5 [5]	0.5	0.12
Manganese	7439-96-5	1,431	ROD Remediation Goals	1.5	0.5	0.13
Mercury	7439-97-6	2.28	ROD Remediation Goals	0.5	0.1	0.0169

SAP Worksheet #15d -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Aroclor 1260 – U.S. EPA 8082A LL

(This portion of the WS is applicable to field soil samples.)

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Action Limit Reference [1]	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					QLs (mg/kg)	MDLs (mg/kg)
Aroclor 1260	11096-82-5	0.21	ROD Remediation Goals	0.1	0.02	0.004

SAP Worksheet #15e -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Total Petroleum Hydrocarbons - purgeables – U.S. EPA 8015C

(This portion of the WS is applicable to field soil samples.)

Analyte	CAS Number	Project Action Limit (ug/kg)	Project Action Limit Reference [1]	Project Quantitation Limit Goal (ug/kg)	Laboratory-specific	
					QLs (ug/kg)	MDLs (ug/kg)
Gasoline	8006-61-9	315,000	Tier 1 Screening Criteria	2,000	1,000	340

SAP Worksheet #15f -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Total Petroleum Hydrocarbons - extractables – U.S. EPA 8015C

(This portion of the WS is applicable to field soil samples.)

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Action Limit Reference [1]	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					QLs (mg/kg)	MDLs (mg/kg)
Diesel	68834-30-5	35	Tier 1 Screening Criteria	10	1	0.65
Motor oil	68476-77-7	1,850	Tier 1 Screening Criteria	100	10	3.51

SAP Worksheet #15g -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Volatile Organic Compounds – U.S. EPA 8260B

(This portion of the WS is applicable to field QC water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Benzene	71-43-2	0.5	Not applicable	0.5	0.5	0.16
Ethylbenzene	100-41-4	0.5	Not applicable	0.5	0.5	0.23
MTBE	1634-04-4	5.0	Not applicable	5.0	0.5	0.19
Naphthalene	91-20-3	1.2	Not applicable	1.2	1.2	0.36
Toluene	108-88-3	0.5	Not applicable	0.5	0.5	0.17
Xylenes (total)	1330-20-7	0.5	Not applicable	0.5	0.5	0.19

SAP Worksheet #15h -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Polycyclic Aromatic Hydrocarbons and Semivolatile Organic Compounds – U.S. EPA 8270DSIM

(This portion of the WS is applicable to field QC water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)		
					QLs (µg/L)	MDLs (µg/L)
Acenaphthene	83-32-9	0.2	Not applicable	0.2	0.2	0.06
Acenaphthylene	208-96-8	0.2	Not applicable	0.2	0.2	0.07
Anthracene	120-12-7	0.2	Not applicable	0.2	0.2	0.11
Benzo(a)anthracene	56-55-3	0.2	Not applicable	0.2	0.2	0.07
Benzo(b)fluoranthene	205-99-2	0.2	Not applicable	0.2	0.2	0.06
Benzo(k)fluoranthene	207-08-9	0.2	Not applicable	0.2	0.2	0.09
Benzo(a)pyrene	50-32-8	0.2	Not applicable	0.2	0.2	0.06
Benzo(g,h,i)perylene	191-24-2	0.2	Not applicable	0.2	0.2	0.08
Bis(2-ethylhexyl) phthalate [4]	117-81-7	5.0	Not applicable	5.0	5.0	2.9
Chrysene	218-01-9	0.2	Not applicable	0.2	0.2	0.08
Dibenz(a,h)anthracene	53-70-3	0.2	Not applicable	0.2	0.2	0.07
1,4-Dichlorobenzene [4]	106-46-7	10	Not applicable	10	10	1.0
3,3'-Dichlorobenzidine [4]	91-94-1	20	Not applicable	20	20	3.0
Fluoranthene	206-44-0	0.2	Not applicable	0.2	0.2	0.08
Fluorene	86-73-7	0.2	Not applicable	0.2	0.2	0.07
Indeno(1,2,3-c,d)pyrene	193-39-5	0.2	Not applicable	0.2	0.2	0.06

Analyte	CAS Number	Project Action Limit [2] (μg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (μg/L)		
					QLs (μg/L)	MDLs (μg/L)
1-Methylnaphthalene	1321-94-4	0.2	Not applicable	0.2	0.2	0.06
2-Methylnaphthalene	91-57-6	0.2	Not applicable	0.2	0.2	0.06
Naphthalene	91-20-3	0.2	Not applicable	0.2	0.2	0.05
n-Nitrosodi-n-propylamine [4]	621-64-7	10	Not applicable	10	10	2.2
Phenanthrene	85-01-8	0.2	Not applicable	0.2	0.2	0.08
Pyrene	129-00-0	0.2	Not applicable	0.2	0.2	0.08

SAP Worksheet #15i -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Metals – U.S. EPA 6010C / DHS LUFT / U.S. EPA 7470A

(This portion of the WS is applicable to field QC water samples.)

Analyte	CAS Number	Project Action Limit [2] (μg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (μg/L)	Laboratory-specific	
					QLs (μg/L)	MDLs (μg/L)
Copper	7440-50-8	5	Not applicable	5	5.0	0.97
Lead (total)	7439-92-1	5	Not applicable	5	5.0	1.58
Organic Lead	ORG PB	300	Not applicable	300	300	21.6
Manganese	7439-96-5	5	Not applicable	5	5.0	1.23
Mercury	7439-97-6	0.2	Not applicable	0.2	0.2	0.06

SAP Worksheet #15j -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Aroclor 1260 – U.S. EPA 8082A LL

(This portion of the WS is applicable to field QC water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Aroclor 1260	11096-82-5	0.5	Not applicable	0.5	0.10	0.03

SAP Worksheet #15k -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Total Petroleum Hydrocarbons - purgeables – U.S. EPA 8015C

(This portion of the WS is applicable to field QC water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Gasoline	8006-61-9	20	Not applicable	20	20	8.6

SAP Worksheet #15l -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Total Petroleum Hydrocarbons - extractables – U.S. EPA 8015C

(This portion of the WS is applicable to field QC water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Diesel	68834-30-5	40	Not applicable	40	40	13.07
Motor oil	68476-77-7	40	Not applicable	40	40	5.54

SAP Worksheet #15m -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Volatile Organic Compounds – U.S. EPA 8260B

(This portion of the WS is applicable to IDW water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Benzene	71-43-2	0.5	Not applicable	0.5	0.5	0.16
Bromobenzene	108-86-1	0.5	Not applicable	0.5	0.5	0.16
Bromodichloromethane	75-27-4	0.5	Not applicable	0.5	0.5	0.14
Bromoform	75-25-2	0.5	Not applicable	0.5	0.5	0.14
Bromomethane	74-83-9	1.0	Not applicable	1.0	1.0	0.24
Carbon tetrachloride	56-23-5	0.5	Not applicable	0.5	0.5	0.10
Chloroethane	75-00-3	0.1	Not applicable	0.1	0.1	0.03
Chlorobenzene	108-90-7	0.5	Not applicable	0.5	0.5	0.21
Chloroform	67-66-3	0.5	Not applicable	0.5	0.5	0.07
Chloromethane	74-87-3	0.5	Not applicable	0.5	0.5	0.31
Dibromochloromethane	124-48-1	0.5	Not applicable	0.5	0.5	0.19
1,2-Dibromo-3-chloropropane	96-12-8	2.0	Not applicable	2.0	2.0	0.76
Dichlorodifluoromethane (Freon 12)	75-71-8	1.0	Not applicable	1.0	1.0	0.19
Dibromomethane	74-95-3	0.5	Not applicable	0.5	0.5	0.20
1,2-DCB	95-50-1	0.5	Not applicable	0.5	0.5	0.17
1,3-DCB	541-73-1	0.5	Not applicable	0.5	0.5	0.11
1,4-DCB	106-46-7	0.5	Not applicable	0.5	0.5	0.19
1,1-Dichloroethane	75-34-3	0.5	Not applicable	0.5	1.0	0.19

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
1,2-Dichloroethane	107-06-2	1.0	Not applicable	1.0	0.5	0.14
1,1-DCE	75-35-4	0.1	Not applicable	0.1	0.5	0.30
cis-1,2-DCE	156-59-2	0.5	Not applicable	0.5	0.5	0.16
trans-1,2-DCE	156-60-5	0.5	Not applicable	0.5	0.5	0.19
1,2-Dichloropropane	78-87-5	0.5	Not applicable	0.5	0.5	0.17
cis-1,3-Dichloropropene	10061-01-5	0.5	Not applicable	0.5	0.5	0.15
trans-1,3-Dichloropropene	10061-02-6	0.5	Not applicable	0.5	0.5	0.18
Ethylbenzene	100-41-4	0.5	Not applicable	0.5	0.5	0.23
Methylene Chloride	75-09-2	5.0	Not applicable	5.0	5.0	0.35
MTBE	1634-04-4	5.0	Not applicable	5.0	0.5	0.19
Naphthalene	91-20-3	1.2	Not applicable	1.2	1.2	0.36
1,1,2,2-Tetrachloroethane	79-34-5	0.5	Not applicable	0.5	0.5	0.10
1,1,1,2-Tetrachloroethane	630-20-6	0.5	Not applicable	0.5	0.5	0.13
PCE	127-18-4	0.5	Not applicable	0.5	0.5	0.15
Toluene	108-88-3	0.5	Not applicable	0.5	0.5	0.17
1,2,4-Trichlorobenzene	120-82-1	0.5	Not applicable	0.5	0.5	0.21
1,1,1-Trichloroethane	71-55-6	0.5	Not applicable	0.5	0.5	0.14
1,1,2-Trichloroethane	79-00-5	0.5	Not applicable	0.5	0.5	0.20
TCE	79-01-6	0.5	Not applicable	0.5	0.5	0.16
Trichlorofluoromethane (Freon 11)	75-69-4	0.5	Not applicable	0.5	0.5	0.24
1,1,2-Trichloro-1,2,2-trifluorethane (Freon 113)	76-13-1	0.5	Not applicable	0.5	0.5	0.21
1,2,3-Trichloropropane	96-18-4	1.0	Not applicable	1.0	1.0	0.39

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Vinyl chloride	75-01-4	0.1	Not applicable	0.1	0.5	0.23
Xylenes (total)	1330-20-7	0.5	Not applicable	0.5	0.5	0.19

SAP Worksheet #15n -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Semi-volatile Organic Compounds – U.S. EPA 8270D

(This portion of the WS is applicable to IDW water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Acenaphthene	83-32-9	10	Not applicable	10	10	2.3
Acenaphthylene	208-96-8	10	Not applicable	10	10	2.3
Anthracene	120-12-7	10	Not applicable	10	10	2.8
Benzo(a)anthracene	56-55-3	10	Not applicable	10	10	2.6
Benzo(b)fluoranthene	205-99-2	10	Not applicable	10	10	2.9
Benzo(g,h,i)perylene	191-24-2	10	Not applicable	10	10	2.5
Benzo(k)fluoranthen	207-08-9	10	Not applicable	10	10	2.9
Benzoic acid	65-85-0	50	Not applicable	50	50	1.0
Benzo(a)pyrene	50-32-8	10	Not applicable	10	10	2.5
Benzyl alcohol	100-51-6	20	Not applicable	20	20	2.0
Benzyl butyl phthalate	85-68-7	10	Not applicable	10	10	2.8
bis (2-ethylhexyl) phthalate	117-81-7	5.0	Not applicable	5.0	5.0	2.9
bis (2-chloroethoxy) methane	111-91-1	10	Not applicable	10	10	2.4
bis (2-chloroethyl) ether	111-44-4	10	Not applicable	10	10	2.2
bis (2-chloroisopropyl) ether	39638-32-9	10	Not applicable	10	10	2.0
4-Bromophenyl phenyl ether	101-55-3	10	Not applicable	10	10	2.6
4-Chloro-3-methylphenol	59-50-7	20	Not applicable	20	20	2.6

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
2-Chloronaphthalene	91-58-7	10	Not applicable	10	10	2.0
2-Chlorophenol	95-57-8	10	Not applicable	10	10	2.0
4-Chlorophenyl phenyl ether	7005-72-3	10	Not applicable	10	10	2.6
Chrysene	218-01-9	10	Not applicable	10	10	2.8
Dibenz(a,h)anthracene	53-70-3	10	Not applicable	10	10	2.5
Dibenzofuran	132-64-9	10	Not applicable	10	10	2.4
1,2-Dichlorobenzene	95-50-1	10	Not applicable	10	10	1.1
1,3-Dichlorobenzene	541-73-1	10	Not applicable	10	10	1.0
1,4-Dichlorobenzene	106-46-7	10	Not applicable	10	10	1.0
1,2,4-Trichlorobenzene	120-82-1	10	Not applicable	10	10	1.3
3,3'-Dichlorobenzidine	91-94-1	20	Not applicable	20	20	3.0
2,4-Dichlorophenol	120-83-2	10	Not applicable	10	10	2.5
Diethyl phthalate	84-66-2	10	Not applicable	10	10	3.0
2,4-Dimethylphenol	105-67-9	10	Not applicable	10	10	2.4
Dimethyl phthalate	131-11-3	10	Not applicable	10	10	2.9
di-n-Butylphthalate	84-74-2	10	Not applicable	10	10	3.2
di-n-Octylphthalate	117-84-0	10	Not applicable	10	10	2.6
4,6-Dinitro-2-methylphenol	534-52-1	50	Not applicable	50	50	2.2
2,4-Dinitrophenol [4]	51-28-5	50	Not applicable	50	50	1.8
2,4-Dinitrotoluene	121-14-2	10	Not applicable	10	10	2.7
2,6-Dinitrotoluene	606-20-2	10	Not applicable	10	10	2.7
Fluoranthene	206-44-0	10	Not applicable	10	10	2.9

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Fluorene	86-73-7	10	Not applicable	10	10	2.5
Hexachlorobenzene	118-74-1	10	Not applicable	10	10	2.7
Hexachlorobutadiene	87-68-3	10	Not applicable	10	10	0.9
Hexachlorocyclopentadiene	77-47-4	10	Not applicable	10	10	0.8
Hexachloroethane	67-72-1	5.0	Not applicable	5.0	5.0	0.8
Indeno(1,2,3-c,d)pyrene	193-39-5	10	Not applicable	10	10	2.4
Isophorone	78-59-1	10	Not applicable	10	10	2.5
2-Methylnaphthalene	91-57-6	10	Not applicable	10	10	1.8
2-Methylphenol (o-Cresol)	95-48-7	10	Not applicable	10	10	1.9
4-Methylphenol (p-Cresol)	106-44-6	10	Not applicable	10	10	1.7
Naphthalene	91-20-3	10	Not applicable	10	10	1.8
Nitrobenzene	98-95-3	10	Not applicable	10	10	2.1
2-Nitrophenol	88-75-5	10	Not applicable	10	10	2.1
4-Nitrophenol	100-02-7	50	Not applicable	50	50	0.8
n-Nitrosodimethylamine	62-75-9	10	Not applicable	10	10	1.7
n-Nitrosodi-n-propylamine	621-64-7	10	Not applicable	10	10	2.2
n-Nitrosodiphenylamine	86-30-6	10	Not applicable	10	10	2.7
Pentachlorophenol	87-86-5	5.0	Not applicable	5.0	5.0	2.8
Phenanthrene	85-01-8	10	Not applicable	10	10	2.7
Phenol	108-95-2	5.0	Not applicable	5.0	5.0	1.0
Pyrene	129-00-0	10	Not applicable	10	10	2.8
2,4,6-Trichlorophenol	88-06-2	10	Not applicable	10	10	2.5

SAP Worksheet #15o -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Metals – U.S. EPA 6010C / DHS LUFT / U.S. EPA 7470A

(This portion of the WS is applicable to IDW water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Aluminum	7429-90-5	100	Not applicable	100	100	19.3
Antimony	7440-36-0	5	Not applicable	5	5.0	1.84
Arsenic	7440-38-2	5	Not applicable	5	5.0	2.45
Barium	7440-39-3	5	Not applicable	5	5.0	0.75
Beryllium	7440-41-7	0.2	Not applicable	0.2	2.0	0.24
Cadmium	7440-43-9	0.2	Not applicable	0.2	5.0	0.51
Chromium (total)	7440-47-3	5	Not applicable	5	5.0	1.37
Cobalt	7440-48-4	5	Not applicable	5	5.0	0.63
Copper	7440-50-8	5	Not applicable	5	5.0	0.97
Lead (total)	7439-92-1	5	Not applicable	5	5.0	1.58
Organic Lead	ORG PB	300	Not applicable	300	300	21.6
Manganese	7439-96-5	5	Not applicable	5	5.0	1.23
Mercury	7439-97-6	0.2	Not applicable	0.2	0.2	0.06
Nickel	7440-02-0	5	Not applicable	5	5.0	0.39
Selenium	7782-49-2	5	Not applicable	5	5.0	3.17
Silver	7440-22-4	1	Not applicable	1	1.0	0.25
Thallium	7440-28-0	5	Not applicable	5	5.0	1.17
Vanadium	7440-62-2	5	Not applicable	5	5.0	0.97
Zinc	7440-66-6	50	Not applicable	50	50.0	2.3

SAP Worksheet #15p -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Aroclor 1260 – U.S. EPA 8082A LL

(This portion of the WS is applicable to IDW water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Aroclor 1260	11096-82-5	0.5	Not applicable	0.5	0.10	0.03

SAP Worksheet #15q -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Total Petroleum Hydrocarbons - purgeables – U.S. EPA 8015C

(This portion of the WS is applicable to IDW water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Gasoline	8006-61-9	20	Not applicable	20	20	8.6

SAP Worksheet #15r -- Reference Limits and Evaluation Table

Matrix: Water
Analytical Group: Total Petroleum Hydrocarbons - extractables – U.S. EPA 8015C

(This portion of the WS is applicable to IDW water samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Diesel	68834-30-5	40	Not applicable	40	40	13.07
Motor oil	68476-77-7	40	Not applicable	40	40	5.54

SAP Worksheet #15s -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Volatile Organic Compounds – U.S. EPA 8260B

(This portion of the WS is applicable to IDW soil samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
Benzene	71-43-2	2.0	Not applicable	2.0	2.0	0.63
Bromobenzene	108-86-1	5.0	Not applicable	5.0	5.0	0.76
Bromodichloromethane	75-27-4	5.0	Not applicable	5.0	5.0	0.69
Bromoform	75-25-2	5.0	Not applicable	5.0	5.0	0.80
Bromomethane	74-83-9	5.0	Not applicable	5.0	5.0	1.60
Carbon tetrachloride	56-23-5	5.0	Not applicable	5.0	5.0	0.80
Chloroethane	75-00-3	5.0	Not applicable	5.0	5.0	1.55
Chlorobenzene	108-90-7	5.0	Not applicable	5.0	5.0	0.49
Chloroform	67-66-3	5.0	Not applicable	5.0	5.0	1.43
Chloromethane	74-87-3	10	Not applicable	10	10	1.82
Dibromochloromethane	124-48-1	5.0	Not applicable	5.0	5.0	0.85
1,2-Dibromo-3-chloropropane	96-12-8	10	Not applicable	10	10	2.19
Dichlorodifluoromethane (Freon 12)	75-71-8	10	Not applicable	10	10	0.83
Dibromomethane	74-95-3	5.0	Not applicable	5.0	5.0	0.65
1,2-Dichlorobenzene (DCB)	95-50-1	5.0	Not applicable	5.0	5.0	0.95
1,3-DCB	541-73-1	5.0	Not applicable	5.0	5.0	0.60
1,4-DCB	106-46-7	5.0	Not applicable	5.0	5.0	0.67
1,1-Dichloroethane	75-34-3	10	Not applicable	10	10	1.13

Analyte	CAS Number	Project Action Limit [2] (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
1,2-Dichloroethane	107-06-2	5.0	Not applicable	5.0	5.0	0.72
1,1-Dichloroethene (DCE)	75-35-4	5.0	Not applicable	5.0	5.0	0.79
cis-1,2-DCE	156-59-2	5.0	Not applicable	5.0	5.0	1.07
trans-1,2-DCE	156-60-5	5.0	Not applicable	5.0	5.0	1.35
1,2-Dichloropropane	78-87-5	5.0	Not applicable	5.0	5.0	0.62
cis-1,3-Dichloropropene	10061-01-5	5.0	Not applicable	5.0	5.0	0.47
trans-1,3-Dichloropropene	10061-02-6	5.0	Not applicable	5.0	5.0	0.43
Ethylbenzene	100-41-4	5.0	Not applicable	5.0	5.0	0.64
Methylene Chloride	75-09-2	50	Not applicable	50	50	4.58
Methyl *tert*-butyl ether (MTBE)	1634-04-4	5.0	Not applicable	5.0	5.0	0.89
Naphthalene	91-20-3	5.0	Not applicable	5.0	5.0	0.41
1,1,2,2-Tetrachloroethane	79-34-5	5.0	Not applicable	5.0	5.0	1.24
1,1,1,2-Tetrachloroethane	630-20-6	5.0	Not applicable	5.0	5.0	0.69
Tetrachloroethene (PCE)	127-18-4	5.0	Not applicable	5.0	5.0	0.54
Toluene	108-88-3	5.0	Not applicable	5.0	5.0	0.19
1,2,4-Trichlorobenzene	120-82-1	5.0	Not applicable	5.0	5.0	0.52
1,1,1-Trichloroethane	71-55-6	5.0	Not applicable	5.0	5.0	0.81
1,1,2-Trichloroethane	79-00-5	5.0	Not applicable	5.0	5.0	0.48
Trichloroethene (TCE)	79-01-6	5.0	Not applicable	5.0	5.0	0.71
Trichlorofluoromethane (Freon 11)	75-69-4	5.0	Not applicable	5.0	5.0	1.26
1,1,2-Trichloro-1,2,2-trifluorethane (Freon 113)	76-13-1	10	Not applicable	10	10	0.83
1,2,3-Trichloropropane	96-18-4	20	Not applicable	20	20	1.24

Analyte	CAS Number	Project Action Limit [2] (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
Vinyl chloride	75-01-4	5.0	Not applicable	5.0	5.0	1.68
Xylenes (total)	1330-20-7	10	Not applicable	10	10	0.68

SAP Worksheet #15t -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Semi-volatile Organic Compounds – U.S. EPA 8270D

(This portion of the WS is applicable to IDW soil samples.)

Analyte	CAS Number	Project Action Limit [2] (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific QLs (µg/kg)	Laboratory-specific MDLs (µg/kg)
Acenaphthene	83-32-9	330	Not applicable	330	330	53.8
Acenaphthylene	208-96-8	330	Not applicable	330	330	53.1
Anthracene	120-12-7	330	Not applicable	330	330	61.3
Benzo(a)anthracene	56-55-3	330	Not applicable	330	330	58.0
Benzo(b)fluoranthene	205-99-2	330	Not applicable	330	330	60.0
Benzo(g,h,i)perylene	191-24-2	330	Not applicable	330	330	55.2
Benzo(k)fluoranthene	207-08-9	330	Not applicable	330	330	61.0
Benzoic acid	65-85-0	330	Not applicable	330	330	29.6
Benzo(a)pyrene	50-32-8	330	Not applicable	330	330	50.7
Benzyl alcohol	100-51-6	330	Not applicable	330	330	55.8
Benzyl butyl phthalate	85-68-7	330	Not applicable	330	330	55.5
bis (2-ethylhexyl) phthalate	117-81-7	660	Not applicable	660	660	61.6
bis (2-chloroethoxy) methane	111-91-1	330	Not applicable	330	330	49.9
bis (2-chloroethyl) ether	111-44-4	330	Not applicable	330	330	50.0
bis (2-chloroisopropyl) ether	39638-32-9	330	Not applicable	330	330	47.3
4-Bromophenyl phenyl ether	101-55-3	330	Not applicable	330	330	56.6
4-Chloro-3-methylphenol	59-50-7	330	Not applicable	330	330	58.8

Analyte	CAS Number	Project Action Limit [2] (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
2-Chloronaphthalene	91-58-7	330	Not applicable	330	330	52.4
2-Chlorophenol	95-57-8	330	Not applicable	330	330	44.3
4-Chlorophenyl phenyl ether	7005-72-3	330	Not applicable	330	330	60.7
Chrysene	218-01-9	330	Not applicable	330	330	60.6
Dibenz(a,h)anthracene	53-70-3	330	Not applicable	330	330	59.4
Dibenzofuran	132-64-9	660	Not applicable	660	660	57.3
1,2-Dichlorobenzene	95-50-1	330	Not applicable	330	330	51.2
1,3-Dichlorobenzene	541-73-1	330	Not applicable	330	330	50.7
1,4-Dichlorobenzene	106-46-7	330	Not applicable	330	330	48.9
1,2,4-Trichlorobenzene	120-82-1	330	Not applicable	330	330	49.4
3,3'-Dichlorobenzidine	91-94-1	660	Not applicable	660	660	56.3
2,4-Dichlorophenol	120-83-2	330	Not applicable	330	330	50.5
Diethyl phthalate	84-66-2	330	Not applicable	330	330	62.1
2,4-Dimethylphenol	105-67-9	330	Not applicable	330	330	43.9
Dimethyl phthalate	131-11-3	330	Not applicable	330	330	63.3
di-n-Butylphthalate	84-74-2	330	Not applicable	330	330	65.9
di-n-Octylphthalate	117-84-0	330	Not applicable	330	330	58.4
4,6-Dinitro-2-methylphenol	534-52-1	660	Not applicable	660	660	56.4
2,4-Dinitrophenol	51-28-5	660	Not applicable	660	660	53.7
2,4-Dinitrotoluene	121-14-2	660	Not applicable	660	660	63.8
2,6-Dinitrotoluene	606-20-2	660	Not applicable	660	660	60.6
Fluoranthene	206-44-0	330	Not applicable	330	330	65.4

Analyte	CAS Number	Project Action Limit[2] (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
Fluorene	86-73-7	330	Not applicable	330	330	61.3
Hexachlorobenzene	118-74-1	660	Not applicable	660	660	60.3
Hexachlorobutadiene	87-68-3	330	Not applicable	330	330	51.7
Hexachlorocyclopentadiene	77-47-4	330	Not applicable	330	330	44.0
Hexachloroethane	67-72-1	330	Not applicable	330	330	49.9
Indeno(1,2,3-c,d)pyrene	193-39-5	330	Not applicable	330	330	60.4
Isophorone	78-59-1	330	Not applicable	330	330	57.0
2-Methylnaphthalene	91-57-6	330	Not applicable	330	330	50.4
2-Methylphenol (o-Cresol)	95-48-7	330	Not applicable	330	330	47.8
4-Methylphenol (p-Cresol)	106-44-6	330	Not applicable	330	330	46.4
Naphthalene	91-20-3	330	Not applicable	330	330	50.5
Nitrobenzene	98-95-3	330	Not applicable	330	330	49.8
2-Nitrophenol	88-75-5	330	Not applicable	330	330	47.8
4-Nitrophenol	100-02-7	660	Not applicable	660	660	59.8
n-Nitrosodimethylamine	62-75-9	330	Not applicable	330	330	87.4
n-Nitrosodi-n-propylamine	621-64-7	330	Not applicable	330	330	54.9
n-Nitrosodiphenylamine	86-30-6	330	Not applicable	330	330	50.6
Pentachlorophenol	87-86-5	660	Not applicable	660	660	58.7
Phenanthrene	85-01-8	660	Not applicable	660	660	58.2
Phenol	108-95-2	330	Not applicable	330	330	43.0
Pyrene	129-00-0	330	Not applicable	330	330	54.1
2,4,6-Trichlorophenol	88-06-2	330	Not applicable	330	330	48.3

SAP Worksheet #15u -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Metals – U.S. EPA 6010C / DHS LUFT / U.S. EPA 7471B

(This portion of the WS is applicable to IDW soil samples.)

Analyte	CAS Number	Project Action Limit [2] (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					QLs (mg/kg)	MDLs (mg/kg)
Aluminum	7429-90-5	10	Not applicable	10	10	1.02
Antimony	7440-36-0	0.5	Not applicable	0.5	0.5	0.10
Arsenic	7440-38-2	0.5	Not applicable	0.5	0.5	0.09
Barium	7440-39-3	0.5	Not applicable	0.5	0.5	0.05
Beryllium	7440-41-7	0.2	Not applicable	0.2	0.2	0.04
Cadmium	7440-43-9	0.5	Not applicable	0.5	0.5	0.03
Chromium (total)	7440-47-3	0.5	Not applicable	0.5	0.5	0.03
Cobalt	7440-48-4	0.5	Not applicable	0.5	0.5	0.05
Copper	7440-50-8	0.5	Not applicable	1.5	0.5	0.09
Lead	7439-92-1	0.5	Not applicable	1.5	0.5	0.09
Organic Lead	ORG PB	1.0	Not applicable	1.0	1.0	0.327
Manganese	7439-96-5	0.5	Not applicable	1.5	0.5	0.13
Mercury	7439-97-6	0.1	Not applicable	0.5	0.1	0.0169
Nickel	7440-02-0	0.5	Not applicable	0.5	0.5	0.07
Selenium	7782-49-2	0.5	Not applicable	0.5	0.5	0.24
Silver	7440-22-4	0.1	Not applicable	0.1	0.1	0.04
Thallium	7440-28-0	0.5	Not applicable	0.5	0.5	0.21
Vanadium	7440-62-2	0.5	Not applicable	0.5	0.5	0.06
Zinc	7440-66-6	5.0	Not applicable	5	5.0	1.15

SAP Worksheet #15v -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Aroclor 1260 – U.S. EPA 8082A LL

(This portion of the WS is applicable to IDW soil samples.)

Analyte	CAS Number	Project Action Limit [2] (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					QLs (mg/kg)	MDLs (mg/kg)
Aroclor 1260	11096-82-5	0.02	Not applicable	0.02	0.02	0.004

SAP Worksheet #15w -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Total Petroleum Hydrocarbons - purgeables – U.S. EPA 8015C

(This portion of the WS is applicable to IDW soil samples.)

Analyte	CAS Number	Project Action Limit [2] (ug/kg)	Project Action Limit Reference[1]	Project Quantitation Limit Goal (ug/kg)	Laboratory-specific	
					QLs (ug/kg)	MDLs (ug/kg)
Gasoline	8006-61-9	1,000	Not applicable	1,000	1,000	340

SAP Worksheet #15x -- Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Total Petroleum Hydrocarbons - extractables – U.S. EPA 8015C

(This portion of the WS is applicable to IDW soil samples.)

Analyte	CAS Number	Project Action Limit [2] (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					QLs (mg/kg)	MDLs (mg/kg)
Diesel	68834-30-5	1	Not applicable	1	1	0.65
Motor oil	68476-77-7	10	Not applicable	10	10	3.51

Notes:

1 Value listed is from the following documents:

Tier 1 Screening Criteria

- Table 1b of the *Final New Preliminary Screening Criteria AND Petroleum Program Strategy, Hunters Point Shipyard, San Francisco, California. December 21, 2007.*
  Values are for shallow soils (0 to 10 feet bgs) for Drinking Water Resource area, residential land use scenario. These PALs will be applicable to the "Provide Data for TPH CAP" SAP goal.

ROD Remediation Goals

- Table 4 of the *Internal Draft Record of Decision for Parcel C, Hunters Point Shipyard, San Francisco, California. March 9, 2009.*
  Values are for residential land use scenario. These PALs will be applicable to the "Fill ROD Data Gaps" SAP goal.

2 The PAL is equivalent to the PQLG and the QL (there is no PAL reference).

3 The PAL is for the sum of 1-methynaphthalene and 2-methylnaphthalene.

4 Target analytes will be analyzed by EPA Method 8270D.

5 The PQLG is the same as the QL because the analytical laboratory cannot achieve a lower QL.

All WS values applicable to soil samples are relative to dry weight of sample.

SAP Worksheet #16 -- Project Schedule / Timeline Table check/revise dates in final row

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Field sampling	KCH	December 2009	3-4 weeks following start of field work	none	
Laboratory analyses	Agriculture & Priority Pollutants Laboratories, Inc.; Calscience Environmental Laboratories, Inc.	The day following submittal of 1st set of samples	48 hours preliminary data after receipt of samples. Final deliverables ten calendar days after receipt of samples.	Analytical data reports (hard-copy and electronic data deliverable) by sample delivery group (SDG)	Ten days after receipt of samples
Analytical data verification and validation	EDV	One week following submittal of first SDG (hard-copy and electronic data deliverable)	20 days following submittal of last SDG	100 percent reviewed analytical data validation reports (hardcopy and validated electronic data deliverable)	20 days following submittal of last SDG
Soil Sampling Technical Systems Audit (TSA)	KCH	1st day of soil sampling activities	1 day duration	Soil sampling Technical System Audit (TSA) Summary Report	14 days following audit
Technical Memorandum submittal to Navy	KCH	December 2009	1 day duration	Technical Memorandum	January 31, 2010

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SAP Worksheet #17 -- Sampling Design and Rationale

The sampling design and rationale were specifically developed to address the goals of this study. The sampling design and rationale are based primarily on Contract Task Order Scope of Work (Navy, 2009) and subsequent revisions requested by the Navy to provide data for the TPH CAP.

The sampling and analytical program consists of the following:

An initial set of 14 "primary" boreholes will be advanced and sampled, in four Parcel C buildings (see Figures 10-3 through 10-6). Soil samples will be collected between depths of approximately 0.5 feet and 10 feet BGS (drilling penetration and groundwater depth permitting), with the number of samples and sample depths varying by borehole. Worksheet #18-A provides borehole-specific sampling depths. Borehole-specific laboratory analyses were developed by the Navy to satisfy the Study Goal.

Up to 22 additional step-out boreholes may be advanced, pending analysis of samples collected from the initial 14 boreholes. KCH will review the analytical data and assess if and where step-out borings are warranted. Step-out sampling will be initiated after approval of locations and target analytes is received from the Navy.

The following revisions were made to the Scope of Work's analytical design in developing the sampling and analytical design for this SAP.

- The Navy requested that additional (relative to the Scope of Work) samples be analyzed for TPH and associated compounds, and these were added to the sample location list.

- The Scope of Work specified the analytical group "polycyclic aromatic hydrocarbons (PAHs)," however it did not specify the target analytes in that group. The analytical data to be generated using this SAP will be utilized by the Navy for both the TPH Corrective Action Program (CAP) and the Parcel C ROD. The analyte list for the TPH CAP contains four additional target analytes, relative to the Parcel C ROD list. To ensure completeness of data and to minimize the potential for field or laboratory error, all samples for PAHs analysis will be for the expanded list of PAH target analytes.

- The Scope of Work stipulates that naphthalene be analyzed in selected samples by EPA Method 8260B (as a volatile organic compound [VOC]). Selected samples are also to be analyzed for PAHs. Because naphthalene is commonly analyzed as a PAH by EPA Method 8270 (as a semivolatile organic compound [SVOC]) and appears on the both the TPH CAP and Parcel C ROD target analytes list as an SVOC, naphthalene will be included in the PAH/SVOC list. Therefore, samples may be analyzed for naphthalene as both a VOC and a PAH/SVOC. Naphthalene analytical results will be evaluated relative to the ROD Remediation Goal and Tier 1 Screening Criteria, as defined in WS #15a and WS #15b.

- The objective of field QC water samples (trip blanks, equipment rinsate blanks, and source water blanks) is to determine the potential for cross-contamination during sample management and transport. Therefore, the target analyte list for the field QC water samples is the same as for the target analyte list for the field soil samples.

- It is possible that there are site contaminants in the investigation areas additional to those being investigated to satisfy the goals of this SAP. Therefore, the target analyte lists for VOCs, SVOCs, and metals analysis for IDW samples was expanded (relative to the target analyte lists for field soil samples) to incorporate the requirements of waste disposal facilities.
- Laboratory analysis for percent moisture was added to all samples so that analytical results could be reported relative to dry weight of samples.

PROCEDURES FOR FIELD ACTIVITIES

Procedures for field activities are provided below.

Preparatory Activities

Concrete slabs will be cored (12-inch diameter) with mechanical equipment, as necessary, to provide access to underlying soils. Coring will be conducted at proposed sampling locations, including primary and "step-out" locations. Non-native baserock underlying the concrete will be removed, as necessary, before advancing boreholes.

Soil Sampling

A stainless steel hand or mechanical auger (approximately 3-inch diameter) will be used to remove soils overlying the sampling interval. Once the top of the soil sampling interval is reached, soil samples will be collected with a manually-operated slide hammer that advances 2-inch diameter by 6-inch long stainless steel sampling sleeves in to undisturbed soil. The slide hammer sampling assembly will be removed from the borehole, and the stainless steel sampling sleeve will be removed from the assembly. Each end of the sampling sleeve will be sealed with Teflon™ tape, then sealed with non-reactive plastic caps. Operation of the auger and slide hammer will be in accordance with the manufacturers' operating instructions.

For soil samples to be analyzed for VOCs and purgeable TPH, composite polymer sampling devices (e.g. En Core® or equivalent) will be used to collect the final soil sample from the sampling sleeve. These small diameter, airtight sampling (coring) devices minimize the loss of volatile constituents from the sample after the sample is collected (i.e. the seal of the vial is never broken between the time the sample is analyzed). The field procedure involves removing the outer one inch of soil from each of the two ends of the sampling sleeve. One 5-gram capacity En Core® sampling vial is advanced into the underlying soil in one end of the sleeve, and two vials are advanced into the other end of the sleeve (generating three separate 5-gram aliquots of soil from each sleeve). The three En Core® sampling vials are withdrawn, hermetically sealed, and placed in a labeled plastic bag. If a particular soil sample density is very high and/or contains grains too large to fit in the En Core® sampling device, then that sample will be transported to the laboratory in the original 2-inch by 6-inch sampling sleeve in which it was collected.

One borehole will be advanced with truck-mounted 8-inch diameter slant-drive augers (due to site access restrictions). The auger will be advanced to the first sampling depth. The soil sample will be collected through the interior of the augers with either a manually-operated slide hammer (as described above) or by mechanically advancing a California split-spoon sampler. After the sampler is retrieved (as discussed above, the augers will be advanced to the next sampling depth and the above process will be repeated until all samples from that borehole are obtained.

After each sample is collected, the sample containers will be immediately labeled and placed in the cooler, to be maintained at temperature of approximately 6° Celsius (°C) or below.

Field Equipment Decontamination

During sampling activities, field personnel will decontaminate non-disposable/non-dedicated sampling equipment after use. Field personnel will take appropriate measures to prevent contamination of clean or decontaminated equipment prior to use. Clean sampling equipment will not be placed directly on the ground or known contaminated surfaces prior to use. When not in active use, decontaminated field equipment will be stored in sealed polyethylene drum liners. Field personnel will wear clean, disposable gloves that do not degrade when exposed to the preservatives or field chemicals. The decontamination procedure will include the following steps:

- Wash with non-phosphate detergent (e.g., Liquinox™).
- Rinse with tap water.
- Final rinse with water from an approved water supply (e.g., distilled or reagent-grade water).

Location Surveying

Following all sample collection activities, each borehole location will be surveyed by a licensed surveyor using the NAD 1927 State Plan Coordinate System.

Borehole Completions

Following all sample collection activities, each borehole will be grouted to within several inches of surface using a slurry consisting of neat cement, bentonite powder, and potable water. The surface of each borehole location will be finished with a slurry of neat cement and potable water. Figure 17-1 is an example soil boring log that will be used to document borehole conditions encountered during drilling.

Management of Investigation-Derived Waste

The IDW generated during soil sampling activities will include the following:

Soil: Waste soil generated during borehole advancement will be stored in labeled, steel Department of Transportation (DOT)-approved 55-gallon drums. Waste characterization samples will be collected for the purpose of profiling the waste soil for disposal. The drums will be left at the site for manifesting, transport, and disposal by another Navy contractor.

Water: Wastewater generated during decontamination of field sampling equipment will be stored in labeled, steel DOT-approved 55-gallon drums. Waste characterization samples will be collected for the purpose of profiling the wastewater for disposal. The drums will be left at the site for manifesting, transport, and disposal by another Navy contractor.

Other Solid Waste: Other solid waste generated during sampling activities will include personal protective equipment (PPE), and miscellaneous trash. This waste will be disposed of as non-regulated solid waste. Concrete cores (to be generated by coring through the building floors) will be left at each work area for disposal by others.

Figure 17-1. Example Boring Log

KCH

BORING LOG

HOLE NO.	PROJECT NO.	PROJECT	SHEET OF
MFG. DESIGNATION OF DRILL		LOCATION	
TYPE OF BIT	HAMMER DATA: WT. LBS. DROP INCHES	ELEV.	TOTAL DEPTH OF HOLE
DATE STARTED	DRILLING AGENCY		
DATE COMPLETED	INSPECTOR	GROUNDWATER DEPTH	TIME
DATE BACKFILLED	CREW		
SURFACE CONDITIONS			

DIST. FROM SURF.	LEGEND	SAMPLE TYPE	SAMPLE NO.	RECOVERY	BLOWS PER 6 IN.	USCS	LOG OF MATERIAL
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							

SHEET ____ OF ____ HOLE NO. ____

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SAP Worksheet #18-A - Sampling Locations and Methods/SOP Requirements Table

This worksheet lists the primary sampling locations. Additional, potential "step-out" sampling locations are listed in WS#18-B.

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-S-01-0.5	Soil	0.5 to 1.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-S-01-2.5	Soil	2.5 to 3.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-S-01-4.5	Soil	4.5 to 5.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-S-01-6.5	Soil	6.5 to 7.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-S-01-8.5	Soil	8.5 to 9.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-S-01-9.5	Soil	9.5 to 10.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-S-02-0.5	Soil	0.5 to 1.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-S-02-2.5	Soil	2.5 to 3.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-S-02-4.5	Soil	4.5 to 5.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-S-02-6.5	Soil	6.5 to 7.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-S-02-8.5	Soil	8.5 to 9.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-S-02-9.5	Soil	9.5 to 10.0	• BTEX • Copper • MTBE • Naphthalene (as a VOC) • Percent moisture SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 203 / 203-S-01-0.5	Soil	0.5 to 1.0	• Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-S-01-2.5	Soil	2.5 to 3.0	• Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-S-02-0.5	Soil	0.5 to 1.0	• Copper • Manganese • Mercury • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-S-02-2.5	Soil	2.5 to 3.0	• Copper • Manganese • Mercury • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-S-03-0.5	Soil	0.5 to 1.0	• Aroclor 1260 • Copper • Organic lead • Percent moisture	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 203 / 203-S-03-2.5	Soil	2.5 to 3.0	• Aroclor 1260 • Copper • Organic lead • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-S-03-4.5	Soil	4.5 to 5.0	• Aroclor 1260 • Copper • Organic lead • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-S-04-0.5	Soil	0.5 to 1.0	• Copper • Naphthalene (as a VOC) • Organic lead • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-S-04-2.5	Soil	2.5 to 3.0	• Copper • Naphthalene (as a VOC) • Organic lead • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-S-04-4.5	Soil	4.5 to 5.0	• Copper • Naphthalene (as a VOC) • Organic lead • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-S-05-0.5	Soil	0.5 to 1.0	• Aroclor 1260 • Copper • Lead (total) • Manganese • Percent moisture	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 203 / 203-S-05-2.5	Soil	2.5 to 3.0	• Aroclor 1260 • Copper • Lead (total) • Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-S-05-4.5	Soil	4.5 to 5.0	• Aroclor 1260 • Copper • Lead (total) • Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-S-06-0.5	Soil	0.5 to 1.0	• BTEX • Naphthalene (as a VOC) • Organic lead • Percent moisture • SVOCs/PAHs • TPH-extractables	One time	1 per analytical group	See WS #17
Building 203 / 203-S-06-2.5	Soil	2.5 to 3.0	• BTEX • Naphthalene (as a VOC) • Organic lead • Percent moisture • SVOCs/PAHs • TPH-extractables	One time	1 per analytical group	See WS #17
Building 203 / 203-S-06-4.5	Soil	4.5 to 5.0	• BTEX • Naphthalene (as a VOC) • Organic lead • Percent moisture • SVOCs/PAHs • TPH-extractables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 203 / 203-S-07-0.5	Soil	0.5 to 1.0	• Aroclor 1260 • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-S-07-2.5	Soil	2.5 to 3.0	• Aroclor 1260 • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-S-07-4.5	Soil	4.5 to 5.0	• Aroclor 1260 • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-S-08-0.5	Soil	0.5 to 1.0	• Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-S-08-2.5	Soil	2.5 to 3.0	• Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-S-08-4.5'	Soil	4.5 to 5.0	• Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 214 / 214-S-01-0.5	Soil	0.5 to 1.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-S-01-2.5	Soil	2.5 to 3.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-S-01-4.5	Soil	4.5 to 5.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-S-01-6.5	Soil	6.5 to 7.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-S-01-8.5	Soil	8.5 to 9.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 214 / 214-S-01-9.5	Soil	9.5 to 10.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-01-0.5	Soil	0.5 to 1.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-01-2.5	Soil	2.5 to 3.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-01-4.5	Soil	4.5 to 5.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-01-6.5	Soil	6.5 to 7.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-01-8.5	Soil	8.5 to 9.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-01-9.5	Soil	9.5 to 10.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-02-0.5	Soil	0.5 to 1.0	• BTEX • Lead (total) • MTBE • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 231E / 231E-S-02-2.5	Soil	2.5 to 3.0	• BTEX • Lead (total) • MTBE • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-02-4.5	Soil	4.5 to 5.0	• BTEX • Lead (total) • MTBE • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-02-6.5	Soil	6.5 to 7.0	• BTEX • Lead (total) • MTBE • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 231E / 231E-S-02-8.5	Soil	8.5 to 9.0	• BTEX • Lead (total) • MTBE • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-02-9.5	Soil	9.5 to 10.0	• BTEX • Lead (total) • MTBE • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-03-0.5	Soil	0.5 to 1.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-03-2.5	Soil	2.5 to 3.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-03-4.5	Soil	4.5 to 5.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-03-6.5	Soil	6.5 to 7.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-03-8.5	Soil	8.5 to 9.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-S-03-9.5	Soil	9.5 to 10.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17

Notes:

1 Depth portion of location IDs may change based on the actual depth of soil samples collected.

2 Depths are relative to the bottom of the concrete slab at the specific borehole location. Actual sampling depths may vary depending on field conditions.

3 Field duplicates will not be collected due to the heterogeneity of the sample matrix.

4 Target analytes consist of SVOCs/PAHs defined in Worksheet #15, both for the TPH CAP and outside of the TPH CAP.

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SAP Worksheet #18-B - Sampling Locations and Methods/SOP Requirements Table

This worksheet lists the potential "step-out" sampling locations. Primary sampling locations are listed in WS#18-A.

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-Step-01-0.5	Soil	0.5 to 1.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables •	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-01-2.5	Soil	2.5 to 3.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables •	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-01-4.5	Soil	4.5 to 5.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables •	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-Step-01-6.5	Soil	6.5 to 7.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables •	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-01-8.5	Soil	8.5 to 9.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-01-9.5	Soil	9.5 to 10.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-02-0.5	Soil	0.5 to 1.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-Step-02-2.5	Soil	2.5 to 3.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-02-4.5	Soil	4.5 to 5.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-02-6.5	Soil	6.5 to 7.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-02-8.5	Soil	8.5 to 9.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-Step-02-9.5	Soil	9.5 to 10.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-03-0.5	Soil	0.5 to 1.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-03-2.5	Soil	2.5 to 3.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-03-4.5	Soil	4.5 to 5.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-Step-03-6.5	Soil	6.5 to 7.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-03-8.5	Soil	8.5 to 9.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-03-9.5	Soil	9.5 to 10.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-04-0.5	Soil	0.5 to 1.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-Step-04-2.5	Soil	2.5 to 3.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-04-4.5	Soil	4.5 to 5.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-04-6.5	Soil	6.5 to 7.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 134 / 134-Step-04-8.5	Soil	8.5 to 9.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 134 / 134-Step-04-9.5	Soil	9.5 to 10.0	• BTEX • Copper • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-01-0.5	Soil	0.5 to 1.0	• Copper • Manganese • Mercury • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-01-2.5	Soil	2.5 to 3.0	• Copper • Manganese • Mercury • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-02-0.5	Soil	0.5 to 1.0	• Copper • Manganese • Mercury • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 203 / 203-Step-02-2.5	Soil	2.5 to 3.0	• Copper • Manganese • Mercury • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-03-0.5	Soil	0.5 to 1.0	• Aroclor 1260 • Copper • Organic lead • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-03-2.5	Soil	2.5 to 3.0	• Aroclor 1260 • Copper • Organic lead • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-03-4.5	Soil	4.5 to 5.0	• Aroclor 1260 • Copper • Organic lead • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-04-0.5	Soil	0.5 to 1.0	• Aroclor 1260 • Copper • Organic lead • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-04-2.5	Soil	2.5 to 3.0	• Aroclor 1260 • Copper • Organic lead • Percent moisture	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 203 / 203-Step-04-4.5	Soil	4.5 to 5.0	• Aroclor 1260 • Copper • Organic lead • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-05-0.5	Soil	0.5 to 1.0	• Copper • Organic lead • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-05-2.5	Soil	2.5 to 3.0	• Copper • Organic lead • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-05-4.5	Soil	4.5 to 5.0	• Copper • Organic lead • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-06-0.5	Soil	0.5 to 1.0	• Arocolor 1260 • Copper • Lead (total) • Organic lead • Manganese • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 203 / 203-Step-06-2.5	Soil	2.5 to 3.0	• Arocolor 1260 • Copper • Lead (total) • Organic lead • Manganese • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-06-4.5	Soil	4.5 to 5.0	• Arocolor 1260 • Copper • Lead (total) • Organic lead • Manganese • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-07-0.5	Soil	0.5 to 1.0	• Aroclor 1260 • Copper • Lead (total) • Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-07-2.5	Soil	2.5 to 3.0	• Aroclor 1260 • Copper • Lead (total) • Manganese • Percent moisture	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 203 / 203-Step-07-4.5	Soil	4.5 to 5.0	• Aroclor 1260 • Copper • Lead (total) • Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-08-0.5	Soil	0.5 to 1.0	• BTEX • Organic lead • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-08-2.5	Soil	2.5 to 3.0	• BTEX • Organic lead • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-08-4.5	Soil	4.5 to 5.0	• BTEX • Organic lead • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 203 / 203-Step-09-0.5	Soil	0.5 to 1.0	• BTEX • Organic lead • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-09-2.5	Soil	2.5 to 3.0	• BTEX • Organic lead • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-09-4.5	Soil	4.5 to 5.0	• BTEX • Organic lead • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-10-0.5	Soil	0.5 to 1.0	• Aroclor 1260 • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-10-2.5	Soil	2.5 to 3.0	• Aroclor 1260 • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-10-4.5	Soil	4.5 to 5.0	• Aroclor 1260 • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-11-0.5	Soil	0.5 to 1.0	• Aroclor 1260 • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-11-2.5	Soil	2.5 to 3.0	• Aroclor 1260 • Percent moisture	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 203 / 203-Step-11-4.5	Soil	4.5 to 5.0	• Aroclor 1260 • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-12-0.5	Soil	0.5 to 1.0	• Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-12-2.5	Soil	2.5 to 3.0	• Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-12-4.5	Soil	4.5 to 5.0	• Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-13-0.5	Soil	0.5 to 1.0	• Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-13-2.5	Soil	2.5 to 3.0	• Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 203 / 203-Step-13-4.5	Soil	4.5 to 5.0	• Manganese • Percent moisture	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-01-0.5	Soil	0.5 to 1.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-01-2.5	Soil	2.5 to 3.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-01-4.5	Soil	4.5 to 5.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-01-6.5	Soil	6.5 to 7.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 214 / 214-Step-01-8.5	Soil	8.5 to 9.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-01-9.5	Soil	9.5 to 10.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-02-0.5	Soil	0.5 to 1.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-02-2.5	Soil	2.5 to 3.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-02-4.5	Soil	4.5 to 5.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-02-6.5	Soil	6.5 to 7.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-02-8.5	Soil	8.5 to 9.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 214 / 214-Step-02-9.5	Soil	9.5 to 10.0	• Lead (total) • Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-01-0.5	Soil	0.5 to 1.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 231E / 231E-Step-01-2.5	Soil	2.5 to 3.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-01-4.5	Soil	4.5 to 5.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-01-6.5	Soil	6.5 to 7.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-01-8.5	Soil	8.5 to 9.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-01-9.5	Soil	9.5 to 10.0	• Lead (total) • Percent moisture	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-02-0.5	Soil	0.5 to 1.0	• BTEX • Lead (total) • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-02-2.5	Soil	2.5 to 3.0	• BTEX • Lead (total) • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 231E / 231E-Step-02-4.5	Soil	4.5 to 5.0	• BTEX • Lead (total) • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-02-6.5	Soil	6.5 to 7.0	• BTEX • Lead (total) • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-02-8.5	Soil	8.5 to 9.0	• BTEX • Lead (total) • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-02-9.5	Soil	9.5 to 10.0	• BTEX • Lead (total) • Naphthalene (as a VOC) • Percent moisture • SVOCs/PAHs • TPH-extractables • TPH-purgeables	One time	1 per analytical group	See WS #17

Sampling Location / ID Number [1]	Matrix	Depth [2] (feet)	Analytical Group	Sampling Frequency	Number of Samples (identify field duplicates) [3]	Sampling SOP Reference
Building 231E / 231E-Step-03-0.5	Soil	0.5 to 1.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-03-2.5	Soil	2.5 to 3.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-03-4.5	Soil	4.5 to 5.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-03-6.5	Soil	6.5 to 7.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-03-8.5	Soil	8.5 to 9.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17
Building 231E / 231E-Step-03-9.5	Soil	9.5 to 10.0	• Percent moisture • SVOCs/PAHs	One time	1 per analytical group	See WS #17

Notes:

[1] Depth portion of location IDs may change based on the actual depth of soil samples collected.

[2] Depths are relative to the bottom of the concrete slab at the specific borehole location. Actual sampling depths may vary depending on field conditions.

[3] Field duplicates will not be collected due to the heterogeneity of the sample matrix.

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SAP Worksheet #19– Analytical SOP Requirements Table

Matrix	Analytical Group	Analytical and Preparation Method / SOP Reference	Containers (number, size, and type)	Sample volume (units)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation / analysis)
Soil	VOCs	U.S. EPA 8260B & 5035A *ANA8260B & ANA5035A*	(3) En Core® (or equivalent) sample vials	5 g	Cool to ≤ 6 °C	48 hours
Water (Field QC and IDW)	VOCs	U.S. EPA 8260B & 5030C *ANA8260B & ANA5030C*	(3) 40-mL VOA vials with Teflon™-lined septum	20 mL	Zero headspace HCl to pH ≤ 2 Cool to ≤ 6 °C	14 days (7 days if unpreserved)
Soil	PAHs	U.S. EPA 8270D SIM & 3550B *ANA8270DSIM & SON009*	(1) stainless steel 2-inch diameter by 6-inch long sampling sleeve with Teflon™ tape and plastic end caps	8 oz	Cool to ≤ 6 °C	14 days / 40 days
Water (Field QC)	PAHs	U.S. EPA 8270D SIM & 3510C *ANA8270DSIM & SEP004*	(1) 1,000-mL amber glass bottle	1,000 mL	Cool to ≤ 6 °C	7 days / 40 days
Soil	SVOCs	U.S. EPA 8270D & 3550B *ANA8270D & SON009*	(1) stainless steel 2-inch diameter by 6-inch long sampling sleeve with Teflon™ tape and plastic end caps	8 oz	Cool to ≤ 6 °C	14 days / 40 days
Water (Field QC and IDW)	SVOCs	U.S. EPA 8270D & 3510C *ANA8270D & SEP004*	(1) 1,000-mL amber glass bottle	1,000 mL	Cool to ≤ 6 °C	7 days / 40 days

Matrix	Analytical Group	Analytical and Preparation Method / SOP Reference	Containers (number, size, and type)	Sample volume (units)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation / analysis)
Soil	Aroclor 1260	U.S. EPA 8082A & 3550B *ANA8082A & SON002*	(1) stainless steel 2-inch diameter by 6-inch long sampling sleeve with Teflon caps	30 g	Cool to ≤ 6 °C	14 days / 40 days
Water (Field QC and IDW)	Aroclor 1260	U.S. EPA 8082A & 3510C *ANA8082A & SEP009*	(1) 1,000-mL amber glass bottle	1,000 mL	Cool to ≤ 6 °C	7 days / 40 days
Soil	TPH-extractables	U.S. EPA 8015C & 3550B & 3630C [1] *ANA8015CD & SON004 & CLN004* [1]	(1) stainless steel 2-inch diameter by 6-inch long sampling sleeve with Teflon™ tape and plastic end caps	8 oz	Cool to ≤ 6 °C	7 days / 40 days
Water (Field QC and IDW)	TPH-extractables	U.S. EPA 8015C & 3510C & 3630C [1] *ANA8015CD & SEP011 & CLN004* [1]	(2) 1,000-mL amber glass bottle	2,000 mL	Cool to ≤ 6 °C	14 days / 40 days
Soil	TPH-purgeables	U.S. EPA 8015C & 5035A *ANA8015G & ANA5035A*	(3) En Core® (or equivalent) sample vials	5 g	Cool to ≤ 6 °C	48 hours
Water (Field QC and IDW)	TPH-purgeables	U.S. EPA 8015C & 5030C *ANA8015G & ANA5030C*	(3) 40-mL VOA vials with Teflon™-lined septum	10 mL	Zero headspace HCl to pH ≤ 2 Cool to ≤ 6 °C	14 days (7 days if unpreserved)
Soil	Metals [2]	U.S. EPA 6010C & 3050B *ANA6010C & PRE3050B*	(1) stainless steel 2-inch diameter by 6-inch long sampling sleeve with Teflon™ tape and plastic end caps	1 g	Cool to ≤ 6 °C	6 months

Matrix	Analytical Group	Analytical and Preparation Method / SOP Reference	Containers (number, size, and type)	Sample volume (units)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation / analysis)
Water (Field QC and IDW)	Metals [2] (total)	U.S. EPA 6010C & 3010A *ANA6010C & PRE3010A*	(1) 500-mL polyethylene container	100 mL	Cool to $\leq$ 6 °C pH $\leq$ 2 with HNO_3	6 months
Soil	Mercury	U.S. EPA 7471B *ANA7471B & PRE7471B*	(1) stainless steel 2-inch diameter by 6-inch long sampling sleeve with Teflon tape and plastic end caps	1 g	Cool to $\leq$ 6 °C	28 days
Water (Field QC and IDW)	Mercury (total)	U.S. EPA 7470A *ANA7470A & PRE7470A*	(1) 500-mL polyethylene container	100 mL	Cool to $\leq$ 6 °C pH $\leq$ 2 with HNO_3	28 days
Soil	Organic lead	DHS LUFT SOP-M602	(1) stainless steel 2-inch diameter by 6-inch long sampling sleeve with Teflon tape and plastic end caps	10 g	Cool to $\leq$ 6 °C	14 days / 40 days
Water (Field QC and IDW)	Organic lead	DHS LUFT SOP-M602	(1) 500-mL amber glass bottle	100 mL	Cool to $\leq$ 6 °C	7 days / 40 days
Soil	Percent Moisture	CLP Method	(1) stainless steel 2-inch diameter by 6-inch long sampling sleeve with Teflon tape and plastic end caps	10 g	Cool to $\leq$ 6 °C	Not applicable

Notes:

1 Silica gel cleanup will be performed on sample extracts from sampling locations within the TPH CAP AOCs.

2 Includes: copper, lead, and/or manganese.

U.S. EPA methods are per U.S. EPA *Test Methods for Evaluating Solid Waste, Physical/Chemical* Methods *(SW-846), Third Edition, Fourth Update (1989).*

Organic lead method is per the California DHS LUFT, October 1989.

Percent moisture method is per the U.S. EPA Contract Laboratory Program Multi-Concentration Inorganic Analysis, ILM4.0, Exhibit D, Part F.

SAP Worksheet #20 – Field Quality Control Sample Summary Table

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs	No. of Source Blanks [2]	No. of Equip. Blanks	No. of VOA Trip Blanks	No. of PT Samples [3]	Total No. of Samples to Lab
Soil	Aroclor 1260	9	None [1]	1	1	1 per field team per set of non-dedicated field equipment per day	None	TBD	Samples + field QC
Soil	BTEX	3	None [1]	1	1	1 per field team per set of non-dedicated field equipment per day	5	TBD	Samples + field QC
Soil	Copper	23	None [1]	2	1	1 per field team per set of non-dedicated field equipment per day	None	Not applicable	Samples + field QC
Soil	Lead (total)	21	None [1]	2	1	1 per field team per set of non-dedicated field equipment per day	None	TBD	Samples + field QC

Matrix	Analytical Group	No. of Sampling Locations	No. of Field *Duplicates*	No. of MS/MSDs	No. of Source *Blanks* [2]	No. of Equip. Blanks	No. of VOA Trip Blanks	No. of PT *Samples* [3]	Total No. of Samples to Lab
Soil	Organic lead	9	None [1]	1	1	1 per field team per set of non-dedicated field equipment per day	None	TBD	Samples + field QC
Soil	Manganese	8	None [1]	1	1	1 per field team per set of non-dedicated field equipment per day	None	TBD	Samples + field QC
Soil	Mercury	2	None [1]	1	1	1 per field team per set of non-dedicated field equipment per day	None	TBD	Samples + field QC
Soil	Naphthalene	8	None [1]	1	1	1 per field team per set of non-dedicated field equipment per day	5	TBD	Samples + field QC
Soil	SVOCs/PAHs	40	None [1]	2	1	1 per field team per set of non-dedicated field equipment per day	None	TBD	Samples + field QC

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs	No. of Source Blanks [2]	No. of Equip. Blanks	No. of VOA Trip Blanks	No. of PT Samples [3]	Total No. of Samples to Lab
Soil	TPH-extractables	3	None [1]	1	1	1 per field team per set of non-dedicated field equipment per day	None	TBD	Samples + field QC
Soil	TPH-purgables	3	None [1]	1	1	1 per field team per set of non-dedicated field equipment per day	None	TBD	Samples + field QC

Notes:

1 Field duplicates will not be collected due to the heterogeneity of the sample matrix.

2 Source blanks will be analyzed for the same analytes as the equipment blanks.

3 TBDs are eligible for a future Proficiency Test (PT) program that will be incorporated into this SAP through an Addendum that will discuss the PT program approach and criteria. PT samples are used to assess the performance of the laboratory (ies), and may be implemented upon direction by the Navy or in response to data quality or compliance issues that are identified.

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SAP Worksheet #21 – Project Sampling SOP References Table

See SAP Worksheet # 17 for detailed field activity procedures.

Reference Number	Title, Revision Date and / or Number	Originating Organization of Sampling SOP	Equipment Type	Modified for Project Work? (Y/N)	Comments

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SAP Worksheet #22 – Field Equipment Calibration, Maintenance, Testing, and Inspection Table

No equipment needing calibration will be used to collect field measurements.

Not Applicable

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SAP Worksheet #23 – Analytical SOP References Table

Lab SOP Number	Title, Revision Date, and / or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
ANA8082A	PCBs and Congeners by U.S. EPA Method 8082A, Revision (Rev.) 0, 07/28/09	definitive	Soil & Water / Aroclor 1260	Gas Chromatography / Electron Capture Detector (GC/ECD)	APPL	N
ANA8260B	GC/MS Analysis by U.S. EPA Method 8260B, Rev. 24, 06/15/09	definitive	Soil & Water / VOCs	Purge/Trap + Gas Chromatography / Mass Spectroscopy (GC/MS)	APPL	N
SOP-M602	Organic Lead (DHS LUFT Method), Rev. 2, 05/27/09	definitive	Soil & Water / Organic Lead	Direct Aspiration (Flame) Atomic Absorption (FLAA)	Calscience	N
ANA7471B	Analysis of Hg in Soils by U.S. EPA Method 7471B, Rev. 0, 06/17/09	definitive	Soil / Mercury	Cold Vapor (AA)	APPL	N
ANA7470A	Analysis of Hg by U.S. EPA Method 7470A, Rev. 18, 04/11/09	definitive	Water / Mercury	Cold Vapor (AA)	APPL	N
ANA6010C	Inductively Coupled Plasma (ICP)-Atomic Emission Spectroscopy (AES) by U.S. EPA Method 6010C, Rev. 1, 07/24/09	definitive	Soil & Water / Metals [1]	ICP	APPL	N

Lab SOP Number	Title, Revision Date, and / or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
ANA8270DSIM	Polycyclic Aromatic Hydrocarbons by SIM, Rev. 0, 06/16/09	definitive	Soil & Water / PAHs	GC/MS	APPL	N
ANA8270D	Semivolatile Organic Compounds by EPA Method 8270D, Rev. 0, 06/16/09	definitive	Soil & Water / SVOCs	GC/MS	APPL	N
ANA8015G	Total Petroleum Hydrocarbons by U.S. EPA Method 8015C, Rev. 7, 06/15/09	definitive	Soil & Water/ TPH-purgeables	Purge/Trap + GC-Flame Ionization Detector (FID)	APPL	N
ANA8015CD	Total Extractable Petroleum Hydrocarbons – Diesel, Rev. 0, 06/16/09	definitive	Soil & Water / TPH-extractables	GC-FID	APPL	N
ANACLP4.0	Percent Solids and Moisture, CLP Method	definitive	Soil / Percent moisture	Gravimetric	APPL	N

Notes:

1 Includes: copper, lead, and manganese.

SAP Worksheet #24 – Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
Gas chromatograph (GC)	Initial: multi-point	Initially and as required per method	<20% relative standard deviation (RSD), correlation coefficient $r^2 \geq 0.990$	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Correct problem in accordance with instrument manufacturer manual/ recommendations or laboratory SOP; Rerun ICV; if that fails, repeat initial calibration.	Laboratory QAM	ANA8082A ANA8015CD ANA8015G INS003 INS004 INS005 INS009 INS010

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC	Continuing: single point	Before and after every 10 samples or every 12 hours (per method)	20% difference	ICV and Continuing Calibration Verification (CCV): Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Correct problem in accordance with instrument manufacturer manual/ recommendations or laboratory SOP; ICV: Rerun ICV. If that fails, repeat initial calibration. CCV: Repeat CCV and reanalyze all samples since last successful calibration verification.	Laboratory QAM	ANA8082A ANA8015CD ANA8015G INS003 INS004 INS005 INS009 INS010

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/MS	Tuning	Prior to initial calibration and at the beginning of each 12 hour period	For 8260B: 4-bromofluorobenzene ion criteria Mass — Required Intensity 50 — 15-40% of mass 95 75 — 30-60% of mass 95 95 — base peak, 100% relative abundance 96 — 5-9% of mass 95 173 — <2% of mass 174 174 — >50% of mass 174 175 — 5-9% of mass 174 176 — 95-101% of mass 174 177 — 5-9% of mass 176 For 8270D and 8270DSIM: decafluorotriphenylphosphine (DFTPP) ion criteria: Mass — Required Intensity 51 — 30-60% of mass 198 68 — <2% of mass 69 70 — < 2% of mass 69 127 — 40-60% of mass 198 197 — <1% of mass 198 198 — base peak, 100% relative abundance 199 — 5-9% of mass 198 275 — 10-30% of mass 198 365 — >1% of mass 198 441 — 0.01-100% of mass 443 442 — >40% of mass 198 443 — 17-23% of mass 442	Retune instrument and verify tuning standard; Rerun affected samples	Laboratory QAM	ANA8260B ANA8270DSIM ANA8270D

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/MS	Initial: multi-point	Initially and as required per method	1. Average response factor (RF) for single-point calibration compounds (SPCCs): VOCs - ≥ 0.30 for chlorobenzene and 1,1,2,2-tetrachlorolethane, ≥ 0.1 for chloromethane, bromoform, and 1,1-dichloroethane. SVOCs - ≥ 0.050. 2. RSD for RFs for continuing calibration compounds (CCCs): VOCs and SVOCs - ≤ 30% and one option below; Option 1: RSD for each analyte ≤ 15% Option 2: linear least squares regression r > 0.995 Option 3: non-linear regression - coefficient of determination $r^2 \geq 0.99$ (6 points shall be used forsecond order, 7 points shall be used for third order.)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Correct problem in accordance with instrument manufacturer manual/ recommendations or laboratory SOP; ICV: Rerun ICV. If that fails, repeat initial calibration. CCV: Repeat CCV and reanalyze all samples since last successful calibration verification.	Laboratory QAM	ANA8260B ANA8270DSIM ANA8270D INS003 INS004 INS005 INS009 INS010

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/MS	Continuing: single point	Daily before sample analysis and every 12 hours	1. Average RF for SPCCs: VOCs - ≥ 0.30 for chlorobenzene and 1,1,2,2-tetrachlorolethane, ≥ 0.1 for chloromethane, bromoform, and 1,1-dichloroethane. SVOCs ≥ 0.050. 2. %Difference/Drift for CCCs: VOCs and SVOCs - ≤ 20%D (Note: D = difference when using RFs or drift when using least squares regression or non-linear calibration.)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Correct problem in accordance with instrument manufacturer manual/ recommendations or laboratory SOP; ICV: Rerun ICV. If that fails, repeat initial calibration. CCV: Repeat CCV and reanalyze all samples since last successful calibration verification.	Laboratory QAM	ANA8260B ANA8270DSIM ANA8270D INS003 INS004 INS005 INS009 INS010

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
Atomic Absorption (AA)	Initial: multi-point (minimum 3 pt + blank)	Initially and as required per method	$r \geq 0.990$ $r \geq 0.995$ (organic lead)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Correct problem in accordance with instrument manufacturer manual/ recommendations or laboratory SOP; Rerun ICV: if that fails, repeat initial calibration.	Laboratory QAM	SOP-M602 ANA7470 ANA7471B INS005

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
AA	Continuing: single point	Every 10 samples at beginning and end of sequence	± 20% difference Within ± 10% of expected value (organic lead)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Correct problem in accordance with instrument manufacturer manual/ recommendations or laboratory SOP; Rerun ICV: if that fails, repeat initial calibration.	Laboratory QAM	SOP-M602 ANA7470 ANA7471B INS005

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
ICP	Initial: blank + one standard or 3 point	Daily	$r \geq 0.990$	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Correct problem in accordance with instrument manufacturer manual/ recommendations or laboratory SOP; Rerun ICV: if that fails, repeat initial calibration.	Laboratory QAM	ANA6010C INS005

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
ICP	Continuing: single point	Every 10 samples at beginning and end of sequence	Within ± 10% of expected value	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Correct problem in accordance with instrument manufacturer manual/ recommendations or laboratory SOP; Repeat continuing calibration and reanalyze all samples since last successful calibration verification.	Laboratory QAM	ANA6010C INS005
ICP	Linear Dynamic Range	Every 6 months or when system is repaired	within ± 10% of true value	Correct problem in accordance with instrument manufacturer manual/ recommendations or laboratory SOPs; repeat calibration.	Laboratory QAM	ANA6010C INS005

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
ICP	Interference Check Solution	At the beginning and end of each analytical run	ICS-A: Absolute value of concentration of non-spiked analytes < 2 x MDL (unless verified trace impurity from one of the spiked analytes) ICS-AB: within ± 20% of true value	Correct problem in accordance with instrument manufacturer manual/ recommendations or laboratory SOPs; repeat calibration; rerun ICS and associated samples	Laboratory QAM	ANA6010C INS005

SAP Worksheet #25 – Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument / Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC	Liner insert, o-rings, septa	Not applicable, testing not performed	Visually inspect for dirt or deterioration	Weekly for liner Monthly for o-rings Daily for septa	Not applicable	Replace liner, o-rings, or septa	Analyst or certified instrument technician	INS003 INS004 INS009 INS010
	Change syringes/syringe needles	Not applicable, testing not performed	Visually inspect for wear or damage	Every 3 months	Not applicable	Replace syringe or syringe needle	Analyst or certified instrument technician	INS003 INS004 INS009 INS010
	Gas drying and purifying cartridges	Not applicable, testing not performed	Visually inspect for traps change of color	Every 6 to 12 months	Lack of moisture	Replace cartridge	Analyst or certified instrument technician	INS005
GC/MS	Liner insert, o-rings, septa	Not applicable, testing not performed	Visually inspect for dirt or deterioration	Weekly for liner Monthly for o-rings Daily for septa	Not applicable	Replace liner, o-rings, or septa	Analyst or certified instrument technician	INS003 INS004 INS009 INS010
	Change syringes/syringe needles	Not applicable, testing not performed	Visually inspect for wear or damage	Every 3 months	Not applicable	Replace syringe or syringe needle	Analyst or certified instrument technician	INS003 INS004 INS009 INS010

Instrument / Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
	Gas drying and purifying cartridges	Not applicable, testing not performed	Visually inspect for traps change of color	Every 6 to 12 months	Lack of moisture	Replace cartridge	Analyst or certified instrument technician	INS005
GC/MS	Vacuum pump oil, tune calibration vial	Not applicable, testing not performed	Visually inspect for discolored fluid	Every 6 months	Per instrument manufacturer's recommendation or laboratory SOP	Refill fluid	Analyst or certified instrument technician	INS003 INS004 INS009 INS010
AA	Check instrument connections, gass flow, pressure	Conduct leak test	Visually inspect for wear or damage and indicator from computer controls	Daily and annual maintenance from manufacturer	Per instrument manufacturer's recommendation or laboratory SOP	Request service from instrument manufacturer	Analyst or certified instrument technician	INS005
ICP	Check instrument connections, gas flow, pressure	Conduct leak test	Visually inspect for wear or damage and indicator from computer controls	Daily and annual maintenance from manufacturer	Per instrument manufacturer's recommendation or laboratory SOP	Request service from instrument manufacturer	Analyst or certified instrument technician	INS005
	Clean or align torch	Conduct leak test	Inspect leak and align torch to center	Every 1 to 2 weeks	No leak and torch centered	Replace or request service from instrument manufacturer	Analyst or certified instrument technician	INS005
	Clean nebulizer and chamber	Not applicable, testing not performed	Visually inspect	Weekly	Absence of foreign objects after cleaning	Replace or request service from instrument manufacturer	Analyst or certified instrument technician	INS005

SAP Worksheet #26 – Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Soil Sampling Field Personnel / KCH
Sample Packaging (Personnel/Organization): Sample Management Coordinator / KCH
Coordination of Shipment (Personnel/Organization): Sample Management Coordinator / KCH
Type of Shipment/Carrier: Courier / Agriculture & Priority Pollutants Laboratories, Inc. (APPL)
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): APPL and Calscience Environmental Laboratories, Inc. (Calscience) designated sample custodian
Sample Custody and Storage (Personnel/Organization): APPL and Calscience designated sample custodian
Sample Preparation (Personnel/Organization): APPL and Calscience sample preparation personnel
Sample Determinative Analysis (Personnel/Organization): APPL and Calscience organic and total analytical chemists
SAMPLE ARCHIVING
Field Sample Storage (number of days from sample collection): Samples will be retained by the laboratory for 60 days after final sample results are reported.
Sample Extract/Digestate Storage (No. of days from extraction/digestion): Extraction time will be in accordance with analytical methods listed in Worksheet #19. Extract will be stored until analyses are performed.
Biological Sample Storage (number of days from sample collection): not applicable – no biological samples will be collected.
SAMPLE DISPOSAL
Personnel/Organization: Laboratory Waste Disposal Coordinator / APPL and Calscience designated sample custodian
Number of Days from Analysis: 60 days after final sample results are reported, unless there is a hold on a particular sample or previous arrangements have been made.

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SAP Worksheet #27 – Sample Custody Requirements Table

Sample Identification Procedures:

Each sample will be given a unique identification number that is carried through the entire process from sample collection to data reporting. Samples will be assigned an alpha-numeric identifier that will be tied to the sampling location (building) and sampling depth. Identifiers for primary sampling locations will be based on the following convention:

"XXX-S-YY-###" where:

XXX = Building number (may be 3 or 4 digits)

S = soil

YY = sequential borehole number at each building (e.g., "01", "02", et seq.)

= depth in feet (e.g. 0.5) relative to the bottom of the concrete slab at the location.

An example sample identifier will be: **134-S-01-0.5**, where Building 134, primary location soil sample, 1st borehole in the building, sampling depth = approximately 0.5 feet below bottom of concrete slab). Figure 27-1 shows an example sample label.

If "step-out" samples are collected, samples will be assigned unique identifiers that follow the same convention above, except that "S" will be replaced by "STEP".

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory):

Custody of field samples will be maintained and custody transfer will be documented from the time of sample collection through receipt of samples at the analytical laboratory, using chain-of-custody (COC) and custody seal procedures. These requirements will be fulfilled by the KCH Sample Management Coordinator. Each sample will be considered to be in the sampler's custody if:

- The sample is in the person's physical possession.
- The sample is in view of the person after that person has taken possession.
- The sample is secured so that no one can tamper with the sample.
- The sample is secured in an area that is restricted to authorized personnel.

Field samples will be handled and prepared in the field for submittal to the analytical laboratory for analysis. Field personnel will use the following procedures when packing and transporting samples to the laboratory:

- Use waterproof metal or equivalent strength plastic coolers for field samples.
- Check samples for proper labeling and sample information.

- Package wet ice or a combination of wet ice and "blue ice" in re-sealable bags and place a layer of ice bags at the bottom of the cooler.

- Package wet ice or a combination of wet ice and "blue ice" in re-sealable bags and place ice bags around and on top of the field samples.

- Put paperwork (i.e., associated COC records) in a re-sealable bag and tape it to the inside lid of the cooler.

- Tape and secure the container.

- Place signed custody seals on the front and/or both sides of the cooler before the custody of the cooler is relinquished to the overnight carrier or courier.

Chain-of-Custody Procedures:

The COC record (see attached Figure 27-2) will document the transfer of sample custody from the time of sample collection to laboratory receipt, and will accompany the samples from the field to the analytical laboratory. Samples will be shipped to the primary analytical laboratory, APPL. If necessary, the primary analytical laboratory will then package and ship samples to back-up laboratory(ies).

When the custody of the samples is relinquished from one party to another, the individuals involved will sign, date, and record the time of transfer on the COC record. The field sampling team will use an internal COC for sample collection until relinquishing samples to Sample Management Coordinator. The COC records may consist of an original top copy and two carbonless copies, or may be a pre-populated electronic format. When using the carbonless COC format, the original and first copies will be transmitted to the primary analytical laboratory with the samples. The second copy will be retained in project files for the Field Operations Manager, Project Chemist, and Database Manager. Hand-written notes identifying samples as "blind" duplicates or other QA/QC submittals will be maintained on the second copy, if applicable. When using the pre-populated electronic COC, the blank fields on the COC record (i.e., sample date and time, etc) will be completed by the Sample Management Coordinator. A copy of each electronic COC will be saved in the project files. Upon the transfer of the samples to the primary analytical laboratory, the Sample Management personnel will sign and date the COC forms. Sample Management personnel will make a copy of the signed COC form, and will also scan a copy of each COC record to be saved electronically in the project files under the associated quarterly sampling event files.

The COC record will be completed by each field sampling team using waterproof ink. Corrections will be made with a single line out, initialing and dating the error, and then entering the correct information. Empty fields on the COC record will be single line crossed out or "Z'd" out, with the date and signature by the field sampling team or Sample Management Coordinator. If samples are to be delivered to the laboratory by an overnight carrier, the airbill number will be recorded and the COC record(s) will be placed in a waterproof plastic bag and taped to the inside lid of the sample cooler prior to sealing. These requirements will be fulfilled by the KCH field sampling personnel and Sample Management Coordinator.

Custody Seals

Custody seals will be placed so that the seals must be broken in order to open the sample cooler. After samples are placed into coolers, two or more custody seals will be placed on the outside of the cooler prior to shipment, using an overnight carrier or courier. Each custody seal will be initialed and dated by the Sample Management Coordinator and affixed to the cooler.

Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal):

Custody of samples will be maintained and custody transfer will be documented from the time of sample receipt through sample disposal by the analytical laboratory consistent with the subcontract laboratory's SOPs. For example, these requirements will be fulfilled by APPL's sample custodian in accordance with APPL's *Receiving Samples,* SOP SHR001, Rev 29, 06/04/09.

The analytical laboratories will have established custody procedures, which include:

- Designation of a sample custodian
- Completion by the custodian of the COC record, any sample tags, and laboratory request sheets, including documentation of sample condition upon receipt
- Laboratory sample tracking and documentation procedures
- Secure sample storage with the appropriate environment (e.g., refrigerated, dry)
- Proper data logging and documentation procedures, including custody of original laboratory records.

Upon arrival of the samples, a sample custodian will take custody of the samples and verify that the information on the sample labels matches the information on the associated COC record. Each cooler temperature will be checked using the cooler's temperature blank. Temperature discrepancies and sample container integrity (i.e., possible damage or tampering) will be checked and documented on the laboratory's sample receipt form. If significant out-of-control conditions are noted at the time of sample receipt, the Project Chemist will immediately be notified. The laboratory will restrict access to the storage areas to authorized laboratory personnel only, to prevent any unauthorized contact with samples, extracts, or documentation. The APPL sample custodian will maintain security of the samples in accordance with APPL's *Security in Sample Receiving,* SOP SHR014, Rev 3, 6/04/09, or equivalent subcontractor laboratory SOP.

Samples will be retained for 60 days after final sample results are reported, unless a request to archive a sample has been made, or previous arrangements have been made to archive the sample. The APPL sample custodian will dispose of samples in accordance with APPL's *Sample Disposal and Waste Collection, Storage and Disposal,* SOP SHR012, Rev 11, 06/26/09, or equivalent subcontractor laboratory SOP.

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Figure 27-1. Example Sample Labels

KCH CLEAN CTO: 003 Site: Hunters Point Sample ID: 134-S-01-0.5 Date: 11/24/09 Time: 1514 Sampler: DE Matrix: Soil Method: 6010C
KCH CLEAN CTO: 003 Site: Hunters Point Sample ID: 134-W-01-0.5 Date: 11/24/09 Time: 1514 Sampler: DE Matrix: Aqueous Method: 6010C

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Figure 27-2. Example Chain of Custody Form

(559) 275 2175

CHAIN OF CUSTODY RECORD

Fresno, CA 93722

Fax: (559) 275-4422

C.O.C. №

Report to: PLEASE PRINT		Invoice to: PLEASE PRINT	
Company Name	Phone:	Company Name	Phone:
Address		Address	
	Fax:		Fax:
Attn:		Attn:	

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number	Date Shipped:
Purchase Order Number	Sampler (Signature)		Carrier:
			Waybill No.:
			Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Number of Containers												Comments

Shuttle Temperature:	Turnaround Requested: MUST CHECK ONE ☐ Standard (2-3 week) ☐ One week ☐ 24-48 hour	Sample Disposal: ☐ Return to client ☐ Disposal by Lab (fee applies)

Relinquished by sampler:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

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SAP Worksheet #28 – Laboratory QC Samples Table

SAP Worksheet #28a – Laboratory QC Samples Table – Soil: VOCs

Matrix	Soil
Analytical Group	VOCs
Analytical Method / SOP Reference	U.S. EPA Method 8260B / *ANA8260B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank (MB)	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect.Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	VOCs
Analytical Method / SOP Reference	U.S. EPA Method 8260B / *ANA8260B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample (LCS)	One per preparation/analytical batch	Refer to Table 28-1 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	%R (Refer to Table 28-1)

Matrix	Soil
Analytical Group	VOCs
Analytical Method / SOP Reference	U.S. EPA Method 8260B / *ANA8260B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix Spike (MS)/MS Duplicate	One per preparation/analytical batch, designated project sample	Refer to Table 28-1 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA)	Laboratory Analyst	Precision/Accuracy	%R, RPD (Refer to Table 28-1)
Internal Standards	Included in every sample	Fluorobenzene; Chlorobenzene-d5; 1,4-Dichlorobenzene-d4 Extracted Ion Current Profile (EICP) area within -50 to +100% of initial calibration (ICAL) midpoint standard	Inspect instrument for malfunctions; reanalyze samples If internal standards remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	EICP area

Matrix	Soil
Analytical Group	VOCs
Analytical Method / SOP Reference	U.S. EPA Method 8260B / *ANA8260B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Surrogates	Included in every sample	Refer to Table 28-1 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-1)

SAP Worksheet #28b – Laboratory QC Samples Table – Water: VOCs

Matrix	Water
Analytical Group	VOCs
Analytical Method / SOP Reference	U.S. EPA Method 8260B / *ANA8260B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank (MB)	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	VOCs
Analytical Method / SOP Reference	U.S. EPA Method 8260B / *ANA8260B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample (LCS)	One per preparation/analytical batch	Refer to Table 28-2 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	%R (Refer to Table 28-2)

Matrix	Water
Analytical Group	VOCs
Analytical Method / SOP Reference	U.S. EPA Method 8260B / *ANA8260B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix Spike (MS)/MS Duplicate	One per preparation/analytical batch, designated project sample	Refer to Table 28-2 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision/Accuracy	%R, RPD (Refer to Table 28-2)
Internal Standards	Included in every sample	Fluorobenzene; Chlorobenzene-d5; 1,4-Dichlorobenzene-d4 Extracted Ion Current Profile (EICP) area within -50 to +100% of initial calibration (ICAL) midpoint standard	Inspect instrument for malfunctions; reanalyze samples If internal standards remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted	Laboratory Analyst	Precision/Accuracy	EICP area

Matrix	Water
Analytical Group	VOCs
Analytical Method / SOP Reference	U.S. EPA Method 8260B / *ANA8260B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Surrogates	Included in every sample	Refer to Table 28-2 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-2)

SAP Worksheet #28c – Laboratory QC Samples Table - Soil: PAHs

Matrix	Soil
Analytical Group	PAHs
Analytical Method / SOP Reference	U.S. EPA Method 8270D SIM / *ANA8270DSIM*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	PAHs
Analytical Method / SOP Reference	U.S. EPA Method 8270D SIM / *ANA8270DSIM*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-1 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	%R (Refer to Table 28-1)

Matrix	Soil
Analytical Group	PAHs
Analytical Method / SOP Reference	U.S. EPA Method 8270D SIM / *AN48270DSIM*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-1 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision/Accuracy	%R, RPD (Refer to Table 28-1)
Internal Standards	Included in every sample	1,4-Dichlorobenzene-d4; Naphthalene-d8; Acenaphthene-d10; Phenanthrene-d10; chrysene-d12; perylene-d12 EICP area within -50 to +100% of ICAL midpoint standard	Inspect instrument for malfunctions; reanalyze samples If internal standards remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	EICP area

Matrix	Soil
Analytical Group	PAHs
Analytical Method / SOP Reference	U.S. EPA Method 8270D SIM / *ANA8270DSIM*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Surrogates	Included in every sample	Refer to Table 28-1 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-1)

SAP Worksheet #28d – Laboratory QC Samples Table - Water: PAHs

Matrix	Water
Analytical Group	PAHs
Analytical Method / SOP Reference	U.S. EPA Method 8270D SIM / *ANA8270DSIM*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	PAHs
Analytical Method / SOP Reference	U.S. EPA Method 8270D SIM / *AN48270DSIM*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-2 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	%R (Refer to Table 28-2)

Matrix	Water
Analytical Group	PAHs
Analytical Method / SOP Reference	U.S. EPA Method 8270D SIM / *ANA8270DSIM*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-2 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision/Accuracy	%R, RPD (Refer to Table 28-2)
Internal Standards	Included in every sample	1,4-Dichlorobenzene-d4; Naphthalene-d8; Acenaphthene-d10; Phenanthrene-d10; chrysene-d12; perylene-d12 EICP area within -50 to +100% of ICAL midpoint standard	Inspect instrument for malfunctions; reanalyze samples If internal standards remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	EICP area

Matrix	Water
Analytical Group	PAHs
Analytical Method / SOP Reference	U.S. EPA Method 8270D SIM / *ANA8270DSIM*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Surrogates	Included in every sample	Refer to Table 28-2 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-2)

SAP Worksheet #28e – Laboratory QC Samples Table - Soil: SVOCs

Matrix	Soil
Analytical Group	SVOCs
Analytical Method / SOP Reference	U.S. EPA Method 8270D / *ANA8270D*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	SVOCs
Analytical Method / SOP Reference	U.S. EPA Method 8270D / *ANA8270D*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-1 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: \ -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	%R (Refer to Table 28-1)

Matrix	Soil
Analytical Group	SVOCs
Analytical Method / SOP Reference	U.S. EPA Method 8270D / *ANA8270D*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-1 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA)	Laboratory Analyst	Precision/Accuracy	%R, RPD (Refer to Table 28-1)
Internal Standards	Included in every sample	1,4-Dichlorobenzene-d4; Naphthalene-d8; Acenaphthene-d10; Phenanthrene-d10; chrysene-d12; perylene-d12 EICP area within -50 to +100% of ICAL midpoint standard	Inspect instrument for malfunctions; reanalyze samples If internal standards remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	EICP area

Matrix	Soil
Analytical Group	SVOCs
Analytical Method / SOP Reference	U.S. EPA Method 8270D / *ANA8270D*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Surrogates	Included in every sample	Refer to Table 28-1 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and *Recommendations for Corrective* Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-1)

SAP Worksheet #28f – Laboratory QC Samples Table - Water: SVOCs

Matrix	Water
Analytical Group	SVOCs
Analytical Method / SOP Reference	U.S. EPA Method 8270D / *ANA8270D*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	SVOCs
Analytical Method / SOP Reference	U.S. EPA Method 8270D / *ANA8270D*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-2 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	%R (Refer to Table 28-2)

Matrix	Water
Analytical Group	SVOCs
Analytical Method / SOP Reference	U.S. EPA Method 8270D / *ANA8270D*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-2 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision/Accuracy	%R, RPD (Refer to Table 28-2)
Internal Standards	Included in every sample	1,4-Dichlorobenzene-d4; Naphthalene-d8; Acenaphthene-d10; Phenanthrene-d10; chrysene-d12; perylene-d12 EICP area within -50 to +100% of ICAL midpoint standard	Inspect instrument for malfunctions; reanalyze samples If internal standards remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	EICP area

Matrix	Water
Analytical Group	SVOCs
Analytical Method / SOP Reference	U.S. EPA Method 8270D / *ANA8270D*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Surrogates	Included in every sample	Refer to Table 28-2 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-2)

SAP Worksheet #28g – Laboratory QC Samples Table - Soil: Aroclor 1260

Matrix	Soil
Analytical Group	Aroclor 1260
Analytical Method / SOP Reference	U.S. EPA Method 8082A / *ANA8082A*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	Aroclor 1260
Analytical Method / SOP Reference	U.S. EPA Method 8082A / *ANA8082A*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-1 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R (Refer to Table 28-1)

Matrix	Soil
Analytical Group	Aroclor 1260
Analytical Method / SOP Reference	U.S. EPA Method 8082A / *ANA8082A*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-1 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision/Accuracy	%R, RPD (Refer to Table 28-1)
Surrogates	Included in every sample	Refer to Table 28-1 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-1)

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SAP Worksheet #28h – Laboratory QC Samples Table- Water: Aroclor 1260

Matrix	Water
Analytical Group	Aroclor 1260
Analytical Method / SOP Reference	U.S. EPA Method 8082A / *ANA8082A*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	Aroclor 1260
Analytical Method / SOP Reference	U.S. EPA Method 8082A / *ANA8082A*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-2 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R (Refer to Table 28-2)

Matrix	Water
Analytical Group	Aroclor 1260
Analytical Method / SOP Reference	U.S. EPA Method 8082A / *ANA8082A*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-2 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision/Accuracy	%R, RPD (Refer to Table 28-2)
Surrogates	Included in every sample	Refer to Table 28-2 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-2)

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SAP Worksheet #28i - Laboratory QC Samples Table: TPH – purgeables – Soil

Matrix	Soil
Analytical Group	TPH-purgeables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015G*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	TPH-purgeables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015G*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-1 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R (Refer to Table 28-1)

Matrix	Soil
Analytical Group	TPH-purgeables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015G*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-1 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision / Accuracy	%R, RPD (Refer to Table 28-1)
Surrogates	Included in every sample	Refer to Table 28-1 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary. If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-1)

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SAP Worksheet #28j - Laboratory QC Samples Table: TPH – purgeables – Water

Matrix	Water
Analytical Group	TPH-purgeables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015G*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	TPH-purgeables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015G*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-2 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R (Refer to Table 28-2)

Matrix	Water
Analytical Group	TPH-purgeables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015G*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-2 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision / Accuracy	%R, RPD (Refer to Table 28-2)
Surrogates	Included in every sample	Refer to Table 28-2 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary. If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports; and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-2)

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SAP Worksheet #28k – Laboratory QC Samples Table: TPH - extractables – Soil

Matrix	Soil
Analytical Group	TPH-extractables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015CD*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	TPH-extractables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015CD*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-1 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R (Refer to Table 28-1)

Matrix	Soil
Analytical Group	TPH-extractables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015CD*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-1 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision / Accuracy	%R, RPD (Refer to Table 28-1)
Surrogates	Included in every sample	Refer to Table 28-1 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary. If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-1)

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SAP Worksheet #28I – Laboratory QC Samples Table: TPH - extractables – Water

Matrix	Water
Analytical Group	TPH-extractables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015CD*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No target compounds > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB except when the sample analysis resulted in a non-detect. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	TPH-extractables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015CD*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-2 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check column resolution/ presence of active sites -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include. -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R (Refer to Table 28-2)

Matrix	Water
Analytical Group	TPH-extractables
Analytical Method / SOP Reference	U.S. EPA Method 8015C / *ANA8015CD*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-2 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision / Accuracy	%R, RPD (Refer to Table 28-2)
Surrogates	Included in every sample	Refer to Table 28-2 (QC Limits)	Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary. If surrogates remain outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	%R (Refer to Table 28-2)

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SAP Worksheet #28m – Laboratory QC Samples Table: Metals - Soil

Matrix	Soil
Analytical Group	Metals
Analytical Method / SOP Reference	U.S. EPA Method 6010C / *ANA6010C* [1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No analytes detected > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB unless sample is non-detect or is 10 times the blank detection. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	Metals
Analytical Method / SOP Reference	U.S. EPA Method 6010C / *ANA6010C* [1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Instrumentation Blank	As specified by method	No target compounds ≥ PQL.	Re-extract or re-analyze samples associated with the MB unless sample is non-detect or is 10 times the blank detection. If IB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	Metals
Analytical Method / SOP Reference	U.S. EPA Method 6010C / *ANA6010C* [1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-1 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check for calculation errors -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R (Refer to Table 28-1)

Matrix	Soil
Analytical Group	Metals
Analytical Method / SOP Reference	U.S. EPA Method 6010C / *ANA6010C* [1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/Matrix Duplicate (MD)	One per preparation/analytical batch, designated project sample	Refer to Table 28-1 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision / Accuracy	%R, RPD (Refer to Table 28-1)
Serial Dilution	One per preparation batch	Five-fold dilution within ± 10% of original measurement	Perform post digestion spike	Laboratory Analyst	Precision	%R
Post Digestion Spike (PDS)	When dilution test fails or analyte concentration in all samples < 50 x limit of detection	75-125 %R	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If PDS may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R

Notes:

[1] Includes: copper, lead, and manganese.

SAP Worksheet #28n – Laboratory QC Samples Table: Metals - Water

Matrix	Water
Analytical Group	Metals
Analytical Method / SOP Reference	U.S. EPA Method 6010C / *ANA6010C* [1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No analytes detected > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB unless sample is non-detect or is 10 times the blank detection. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	Metals
Analytical Method / SOP Reference	U.S. EPA Method 6010C / *ANA6010C* [1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Instrumentation Blank	As specified by method	No target compounds ≥ PQL.	Re-extract or re-analyze samples associated with the MB unless sample is non-detect or is 10 times the blank detection. If IB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	Metals
Analytical Method / SOP Reference	U.S. EPA Method 6010C / *ANA6010C* [1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-2 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check for calculation errors -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R (Refer to Table 28-2)

Matrix	Water
Analytical Group	Metals
Analytical Method / SOP Reference	U.S. EPA Method 6010C / *ANA6010C* [1]

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/Matrix Duplicate (MD)	One per preparation/analytical batch, designated project sample	Refer to Table 28-2 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA)	Laboratory Analyst	Precision / Accuracy	%R, RPD (Refer to Table 28-2)
Serial Dilution	One per preparation batch	Five-fold dilution within ± 10% of original measurement	Perform post digestion spike	Laboratory Analyst	Precision	%R
Post Digestion Spike (PDS)	When dilution test fails or analyte concentration in all samples < 50 x limit of detection	75-125 %R	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If PDS may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R

Notes: [1] Includes: copper, lead, and manganese.

SAP Worksheet #28o – Laboratory QC Samples Table: Mercury - Soil

Matrix	Soil
Analytical Group	Mercury
Analytical Method / SOP Reference	U.S. EPA Method 7471B / *ANA7471B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No analytes detected > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB unless sample is non-detect or is 10 times the blank detection. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	Mercury
Analytical Method / SOP Reference	U.S. EPA Method 7471B / *ANA7471B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Instrumentation Blank	As specified by method	No target compounds ≥ PQL.	Re-extract or re-analyze samples associated with the IB unless sample is non-detect or is 10 times the blank detection. If IB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	Mercury
Analytical Method / SOP Reference	U.S. EPA Method 7471B / *ANA7471B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-1 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check for calculation errors -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R (Refer to Table 28-1)

Matrix	Soil
Analytical Group	Mercury
Analytical Method / SOP Reference	U.S. EPA Method 7471B / *ANA7471B*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/Matrix Duplicate (MD)	One per preparation/analytical batch, designated project sample	Refer to Table 28-1 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision / Accuracy	%R, RPD (Refer to Table 28-1)

SAP Worksheet #28p – Laboratory QC Samples Table: Mercury - Water

Matrix	Water
Analytical Group	Mercury
Analytical Method / SOP Reference	U.S. EPA Method 7470A / *ANA7470A*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No analytes detected > ½ PQL. For common laboratory contaminants, no analytes detected > PQL.	Re-extract or re-analyze samples associated with the MB unless sample is non-detect or is 10 times the blank detection. If MB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	Mercury
Analytical Method / SOP Reference	U.S. EPA Method 7470A / *ANA7470A*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Instrumentation Blank	As specified by method	No target compounds ≥ PQL.	Re-extract or re-analyze samples associated with the IB unless sample is non-detect or is 10 times the blank detection. If IB remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	Mercury
Analytical Method / SOP Reference	U.S. EPA Method 7470A / *ANA7470A*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparation/analytical batch	Refer to Table 28-2 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check for calculation errors -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available If LCS remains outside of acceptance criteria and may impact the quality of the data, a Quality Control Exception Report will be completed to document the nonconformance in accordance with the laboratory SOP QC033 (Control of Nonconforming Environmental Test Work, Quality Control Exception Reports, and Recommendations for Corrective Action Reports) and the client will be contacted.	Laboratory Analyst	Accuracy	%R (Refer to Table 28-2)

Matrix	Water
Analytical Group	Mercury
Analytical Method / SOP Reference	U.S. EPA Method 7470A / *ANA7470A*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/Matrix Duplicate (MD)	One per preparation/analytical batch, designated project sample	Refer to Table 28-2 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision / Accuracy	%R, RPD (Refer to Table 28-2)

SAP Worksheet #28q– Laboratory QC Samples Table: Organic Lead – Soil

Matrix	Soil
Analytical Group	Organic Lead
Analytical Method / SOP Reference	DHS LUFT / *SOP-M602*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No target compounds ≥ PQL	Re-extract or re-analyze samples associated with the MB unless sample is non-detect or is 10 times the blank detection. If MB remains outside of acceptance criteria and may impact the quality of the data, corrective measures may be performed and documented in accordance with the laboratory SOP-T020 (Internal Quality Control Checks) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Soil
Analytical Group	Organic Lead
Analytical Method / SOP Reference	DHS LUFT / *SOP-M602*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS/LCSD	One per preparation/analytical batch	Refer to Table 28-1 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check for calculation errors -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, corrective measures may be performed and documented in accordance with the laboratory SOP-T020 (Internal Quality Control Checks) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	%R (Refer to Table 28-1)

Matrix	Soil
Analytical Group	Organic Lead
Analytical Method / SOP Reference	DHS LUFT / *SOP-M602*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-1 (QC Limits)	Examine the project-specific DQOs Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision/Accuracy	%R, RPD (Refer to Table 28-1)

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SAP Worksheet #28r– Laboratory QC Samples Table: Organic Lead – Water

Matrix	Water
Analytical Group	Organic Lead
Analytical Method / SOP Reference	DHS LUFT / *SOP-M602*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	One per preparation/analytical batch	No target compounds ≥ PQL	Re-extract or re-analyze samples associated with the MB unless sample is non-detect or is 10 times the blank detection. If MB remains outside of acceptance criteria and may impact the quality of the data, corrective measures may be performed and documented in accordance with the laboratory SOP-T020 (Internal Quality Control Checks) and the client will be contacted.	Laboratory Analyst	Accuracy/Bias	Detections less than QLs

Matrix	Water
Analytical Group	Organic Lead
Analytical Method / SOP Reference	DHS LUFT / *SOP-M602*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS/LCSD	One per preparation/analytical batch	Refer to Table 28-2 (QC Limits)	Identify source of problem, such as: -inspect instrument for leaks -check for calculation errors -check standard concentrations; Identify and implement corrective measures specific to the root cause of the problem, and may include: -preparation of new spiking standard, -instrument recalibration, -reanalysis of sample Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. If LCS remains outside of acceptance criteria and may impact the quality of the data, corrective measures may be performed and documented in accordance with the laboratory SOP-T020 (Internal Quality Control Checks) and the client will be contacted.	Laboratory Analyst	Precision/Accuracy	%R (Refer to Table 28-2)

Matrix	Water
Analytical Group	Organic Lead
Analytical Method / SOP Reference	DHS LUFT / *SOP-M602*

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MS/MSD	One per preparation/analytical batch, designated project sample	Refer to Table 28-2 (QC Limits)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken. If LCS is also out, samples and MS/MSD are extracted if sufficient sample available (See above for LCS CA).	Laboratory Analyst	Precision/Accuracy	%R, RPD (Refer to Table 28-2)

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Table 28-1. Method/SOP QC Acceptance Limits - Soil

ANALYTE	Method/SOP QC Acceptance Limits	
QC Parameters	**MS/LCS (%R)**	**MSD (RPD)**
VOCs by EPA Method 8260B		
Benzene	75-125	≤ 30
Bromobenzene	65-120	≤ 30
Bromodichloromethane	70-125	≤ 30
Bromoform	55-135	≤ 30
Bromomethane	30-160	≤ 30
Carbon tetrachloride	65-135	≤ 30
Chloroethane	40-155	≤ 30
Chlorobenzene	75-125	≤ 30
Chloroform	70-125	≤ 30
Chloromethane	50-130	≤ 30
Dibromochloromethane	65-130	≤ 30
1,2-Dibromo-3-chloropropane	40-135	≤ 30
Dichlorodifluoromethane (Freon 12)	35-135	≤ 30
Dibromomethane	75-130	≤ 30
1,2-Dichlorobenzene (DCB)	75-120	≤ 30
1,3-DCB	70-125	≤ 30
1,4-DCB	70-125	≤ 30
1,1-Dichloroethane	75-125	≤ 30
1,2-Dichloroethane	70-135	≤ 30
1,1-Dichloroethene (DCE)	65-135	≤ 30
cis-1,2-DCE	65-125	≤ 30
trans-1,2-DCE	65-135	≤ 30
1,2-Dichloropropane	70-120	≤ 30
cis-1,3-Dichloropropene	70-125	≤ 30
trans-1,3-Dichloropropene	65-125	≤ 30
Ethylbenzene	75-125	≤ 30
Methylene Chloride	55-140	≤ 30
Methyl *tert*-butyl ether (MTBE)	65-135	≤ 30
Naphthalene	40-125	≤ 30
1,1,2,2-Tetrachloroethane	55-130	≤ 30
1,1,1,2-Tetrachloroethane	75-125	≤ 30
Tetrachloroethene (PCE)	65-140	≤ 30
Toluene	75-125	≤ 30
1,2,4-Trichlorobenzene	65-130	≤ 30
1,1,1-Trichloroethane	70-130	≤ 30
1,1,2-Trichloroethane	60-125	≤ 30
Trichloroethene (TCE)	75-125	≤ 30
Trichlorofluoromethane (Freon 11)	25-185	≤ 30
1,1,2-Trichloro-1,2,2-trifluorethane (Freon 113)	71-135	≤ 30
1,2,3-Trichloropropane	65-130	≤ 30
Vinyl chloride	60-125	≤ 30

Table 28-1. Method/SOP QC Acceptance Limits - Soil

ANALYTE	Method/SOP QC Acceptance Limits	
QC Parameters	MS/LCS (%R)	MSD (RPD)
Xylenes (total)	80-125	≤ 30
VOC Surrogates		
4-Bromofluorobenzene	85-120	Not applicable
Toluene-d8	85-115	Not applicable
PAHs by EPA Method 8270D SIM		
Acenaphthene	45-110	≤ 30
Acenaphthylene	45-105	≤ 30
Anthracene	55-105	≤ 30
Benzo(a)anthracene	50-110	≤ 30
Benzo (b)fluoranthene	45-115	≤ 30
Benzo(k)fluoranthene	45-125	≤ 30
Benzo(a)pyrene	50-110	≤ 30
Benzo(g,h,i)perylene	40-125	≤ 30
Chrysene	55-110	≤ 30
Dibenz (a,h) anthracene	40-125	≤ 30
Fluoranthene	55-115	≤ 30
Fluorene	50-110	≤ 30
Indeno (1,2,3-cd) pyrene	40-120	≤ 30
1-Methylnaphthalene	45-105	≤ 30
2-Methylnaphthalene	45-105	≤ 30
Naphthalene	40-105	≤ 30
Phenanthrene	50-110	≤ 30
Pyrene	45-125	≤ 30
PAH Surrogates		
2-Fluorobiphenyl	45-105	Not applicable
Nitrobenzene-d5	35-100	Not applicable
p-terphenyl-d14	30-125	Not applicable
SVOCs by EPA Method 8270D		
Acenaphthene	45-110	≤ 30
Acenaphthylene	45-105	≤ 30
Anthracene	55-105	≤ 30
Benzo(a)anthracene	50-110	≤ 30
Benzo(b)fluoranthene	45-115	≤ 30
Benzo(g,h,i)perylene	40-125	≤ 30
Benzo(k)fluoranthene	45-125	≤ 30
Benzoic acid	0-110	≤ 30
Benzo(a)pyrene	55-110	≤ 30
Benzyl alcohol	20-125	≤ 30
Benzyl butyl phthalate	50-125	≤ 30
bis (2-ethylhexyl) phthalate	45-125	≤ 30
bis (2-chloroethoxy) methane	45-110	≤ 30
bis (2-chloroethyl) ether	40-105	≤ 30

Table 28-1. Method/SOP QC Acceptance Limits - Soil

ANALYTE	Method/SOP QC Acceptance Limits	
QC Parameters	MS/LCS (%R)	MSD (RPD)
bis (2-chloroisopropyl) ether	20-115	≤ 30
4-Bromophenyl phenyl ether	45-115	≤ 30
4-Chloro-3-methylphenol	45-115	≤ 30
2-Chloronaphthalene	45-105	≤ 30
2-Chlorophenol	45-105	≤ 30
4-Chlorophenyl phenyl ether	45-110	≤ 30
Chrysene	55-110	≤ 30
Dibenz(a,h)anthracene	40-125	≤ 30
Dibenzofuran	50-105	≤ 30
1,2-Dichlorobenzene	45-95	≤ 30
1,3-Dichlorobenzene	40-100	≤ 30
1,4-Dichlorobenzene	35-105	≤ 30
1,2,4-Trichlorobenzene	45-110	≤ 30
3,3'-Dichlorobenzidine	10-130	≤ 30
2,4-Dichlorophenol	45-110	≤ 30
Diethyl phthalate	50-115	≤ 30
2,4-Dimethylphenol	30-105	≤ 30
Dimethyl phthalate	50-110	≤ 30
di-n-Butylphthalate	55-110	≤ 30
di-n-Octylphthalate	40-130	≤ 30
4,6-Dinitro-2-methylphenol	30-135	≤ 30
2,4-Dinitrophenol	15-130	≤ 30
2,4-Dinitrotoluene	15-130	≤ 30
2,6-Dinitrotoluene	50-110	≤ 30
Fluoranthene	55-115	≤ 30
Fluorene	50-110	≤ 30
Hexachlorobenzene	45-120	≤ 30
Hexachlorobutadiene	40-115	≤ 30
Hexachlorocyclopentadiene	25-151	≤ 30
Hexachloroethane	35-110	≤ 30
Indeno(1,2,3-c,d)pyrene	40-120	≤ 30
Isophorone	45-110	≤ 30
2-Methylnaphthalene	45-105	≤ 30
2-Methylphenol (o-Cresol)	40-105	≤ 30
4-Methylphenol (p-Cresol)	40-105	≤ 30
Naphthalene	40-105	≤ 30
Nitrobenzene	40-115	≤ 30
2-Nitrophenol	40-110	≤ 30
4-Nitrophenol	15-140	≤ 30
n-Nitrosodimethylamine	20-115	≤ 30
n-Nitrosodi-n-propylamine	40-115	≤ 30
n-Nitrosodiphenylamine	50-115	≤ 30
Pentachlorophenol	25-120	≤ 30
Phenanthrene	50-110	≤ 30

Table 28-1. Method/SOP QC Acceptance Limits - Soil

ANALYTE	Method/SOP QC Acceptance Limits	
QC Parameters	**MS/LCS (%R)**	**MSD (RPD)**
Phenol	40-100	≤ 30
Pyrene	45-125	≤ 30
2,4,6-Trichlorophenol	45-110	≤ 30
SVOC Surrogates		
2-Fluorophenol	35-105	Not applicable
2-Fluorobiphenyl	45-105	Not applicable
Nitrobenzene-d5	35-100	Not applicable
2,4,6-Tribromophenol	35-125	Not applicable
Terphenyl-d14	30-125	Not applicable
Aroclor 1260 by EPA Method 8082A		
Aroclor 1016	40-140	≤ 30
Aroclor 1260	60-130	≤ 30
Aroclor 1260 Surrogates		
Decachlorobiphenyl	60-125	Not applicable
TPH-purgeables by EPA Method 8015C		
Gasoline	37-150	≤ 25
TPH-purgeables Surrogates		
Bromofluorobenzene	76-131	Not applicable
TPH-extractables by EPA Method 8015C		
Diesel	50-150	≤ 30
Motor Oil	50-150	≤ 30
TPH-purgeables Surrogates		
Octacosane	60-140	Not applicable
o-Terphenyl	60-140	Not applicable
Metals by EPA Method 6010C		
Aluminum	80-120	≤ 20
Antimony	80-120	≤ 20
Arsenic	80-120	≤ 20
Barium	80-120	≤ 20
Beryllium	80-120	≤ 20
Cadmium	80-120	≤ 20
Chromium (total)	80-120	≤ 20
Cobalt	80-120	≤ 20
Copper	80-120	≤ 20
Lead	80-120	≤ 20
Manganese	80-120	≤ 20
Nickel	80-120	≤ 20
Selenium	80-120	≤ 20
Silver	80-120	≤ 20
Thallium	80-120	≤ 20
Vanadium	80-120	≤ 20

Table 28-1. Method/SOP QC Acceptance Limits - Soil

ANALYTE	Method/SOP QC Acceptance Limits	
QC Parameters	**MS/LCS (%R)**	**MSD (RPD)**
Zinc	80-120	≤ 20
Mercury by EPA Method 7471B		
Mercury	83-118	≤ 30
Organic Lead by the DHS LUFT Method		
Organic lead	22-148 [1] 72-126 [2]	≤ 18 [1] ≤ 30 [2]

Notes
%R: percent recovery
MS/LCS: matrix spike/laboratory control sample
MSD: matrix spike duplicate
RPD: relative percent difference
MS/LCS: matrix spike/laboratory control sample
MS/LCS: matrix spike/laboratory control sample
PAHs: polycyclic aromatic compounds
QC: quality control
SIM: selective ion monitoring
SOP: standard operating procedure
SVOC: semivolatile organic compounds
TPH: total petroleum hydrocarbons
VOC: volatile organic compound

[1] Control limits for MS/MSD.
[2] Control limits for LCS/LCSD.

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Table 28-2. Method/SOP QC Acceptance Limits - Water

ANALYTE	Method/SOP QC Acceptance Limits	
QC Parameters	**MS/LCS (%R)**	**MSD (RPD)**
VOCs by EPA Method 8260B		
Benzene	80-120	≤ 30
Bromobenzene	75-125	≤ 30
Bromodichloromethane	75-120	≤ 30
Bromoform	70-130	≤ 30
Bromomethane	30-145	≤ 30
Carbon tetrachloride	65-140	≤ 30
Chloroethane	60-135	≤ 30
Chlorobenzene	80-120	≤ 30
Chloroform	65-135	≤ 30
Chloromethane	40-125	≤ 30
Dibromochloromethane	65-135	≤ 30
1,2-Dibromo-3-chloropropane	50-130	≤ 30
Dichlorodifluoromethane (Freon 12)	30-155	≤ 30
Dibromomethane	75-125	≤ 30
1,2-Dichlorobenzene (DCB)	70-120	≤ 30
1,3-DCB	75-125	≤ 30
1,4-DCB	75-125	≤ 30
1,1-Dichloroethane	70-130	≤ 30
1,2-Dichloroethane	70-130	≤ 30
1,1-Dichloroethene (DCE)	70-130	≤ 30
cis-1,2-DCE	70-125	≤ 30
trans-1,2-DCE	60-140	≤ 30
1,2-Dichloropropane	75-125	≤ 30
cis-1,3-Dichloropropene	70-130	≤ 30
trans-1,3-Dichloropropene	55-140	≤ 30
Ethylbenzene	75-125	≤ 30
Methylene Chloride	55-140	≤ 30
Methyl *tert*-butyl ether (MTBE)	65-125	≤ 30
Naphthalene	50-140	≤ 30
1,1,2,2-Tetrachloroethane	65-130	≤ 30
1,1,1,2-Tetrachloroethane	80-130	≤ 30
Tetrachloroethene (PCE)	45-150	≤ 30
Toluene	75-120	≤ 30
1,2,4-Trichlorobenzene	65-135	≤ 30
1,1,1-Trichloroethane	65-130	≤ 30
1,1,2-Trichloroethane	75-125	≤ 30
Trichloroethene (TCE)	70-125	≤ 30
Trichlorofluoromethane (Freon 11)	60-145	≤ 30
1,1,2-Trichloro-1,2,2-trifluorethane (Freon 113)	65-125	≤ 30

Table 28-2. Method/SOP QC Acceptance Limits - Water

ANALYTE	Method/SOP QC Acceptance Limits	
QC Parameters	**MS/LCS (%R)**	**MSD (RPD)**
1,2,3-Trichloropropane	75-125	≤ 30
Vinyl chloride	50-145	≤ 30
Xylenes (total)	80-120	≤ 30
VOC Surrogates		
4-Bromofluorobenzene	75-120	not applicable
Toluene-d8	85-120	not applicable
PAHs by EPA Method 8270D SIM		
Acenaphthene	45-110	≤ 20
Acenaphthylene	50-105	≤ 20
Anthracene	55-110	≤ 20
Benzo(a)anthracene	55-110	≤ 20
Benzo (b)fluoranthene	45-120	≤ 20
Benzo(k)fluoranthene	45-125	≤ 20
Benzo(a)pyrene	55-110	≤ 20
Benzo(g,h,i)perylene	40-125	≤ 20
Chrysene	55-110	≤ 20
Dibenz (a,h) anthracene	40-125	≤ 20
Fluoranthene	55-115	≤ 20
Fluorene	50-110	≤ 20
Indeno (1,2,3-cd) pyrene	45-125	≤ 20
1-Methylnaphthalene	35-131	≤ 20
2-Methylnaphthalene	40-105	≤ 20
Naphthalene	40-100	≤ 20
Phenanthrene	50-115	≤ 20
Pyrene	50-130	≤ 20
PAH Surrogates		
2-Fluorobiphenyl	50-110	not applicable
Nitrobenzene-d5	40-110	Not applicable
p-Terphenyl-d14	50-135	Not applicable
SVOCs by EPA Method 8270D		
Acenaphthene	45-110	≤ 30
Acenaphthylene	50-105	≤ 30
Anthracene	55-110	≤ 30
Benzo(a)anthracene	55-110	≤ 30
Benzo(b)fluoranthene	45-120	≤ 30
Benzo(g,h,i)perylene	40-125	≤ 30
Benzo(k)fluoranthene	45-125	≤ 30
Benzoic acid	0-125	≤ 30
Benzo(a)pyrene	55-110	≤ 30
Benzyl alcohol	30-110	≤ 30
Benzyl butyl phthalate	45-110	≤ 30
bis (2-ethylhexyl) phthalate	40-125	≤ 30

Table 28-2. Method/SOP QC Acceptance Limits - Water

ANALYTE	Method/SOP QC Acceptance Limits	
QC Parameters	**MS/LCS (%R)**	**MSD (RPD)**
bis (2-chloroethoxy) methane	45-105	≤ 30
bis (2-chloroethyl) ether	35-110	≤ 30
bis (2-chloroisopropyl) ether	25-130	≤ 30
4-Bromophenyl phenyl ether	50-115	≤ 30
4-Chloro-3-methylphenol	45-110	≤ 30
2-Chloronaphthalene	50-105	≤ 30
2-Chlorophenol	35-105	≤ 30
4-Chlorophenyl phenyl ether	50-110	≤ 30
Chrysene	55-110	≤ 30
Dibenz(a,h)anthracene	40-125	≤ 30
Dibenzofuran	55-105	≤ 30
1,2-Dichlorobenzene	35-100	≤ 30
1,3-Dichlorobenzene	30-100	≤ 30
1,4-Dichlorobenzene	30-100	≤ 30
1,2,4-Trichlorobenzene	35-105	≤ 30
3,3'-Dichlorobenzidine	20-110	≤ 30
2,4-Dichlorophenol	50-105	≤ 30
Diethyl phthalate	40-125	≤ 30
2,4-Dimethylphenol	30-110	≤ 30
Dimethyl phthalate	25-125	≤ 30
di-n-Butylphthalate	55-115	≤ 30
di-n-Octylphthalate	35-135	≤ 30
4,6-Dinitro-2-methylphenol	40-130	≤ 30
2,4-Dinitrophenol	15-140	≤ 30
2,4-Dinitrotoluene	50-120	≤ 30
2,6-Dinitrotoluene	50-115	≤ 30
Fluoranthene	55-115	≤ 30
Fluorene	50-110	≤ 30
Hexachlorobenzene	50-110	≤ 30
Hexachlorobutadiene	25-105	≤ 30
Hexachlorocyclopentadiene	25-105	≤ 30
Hexachloroethane	30-95	≤ 30
Indeno(1,2,3-c,d)pyrene	45-125	≤ 30
Isophorone	50-110	≤ 30
2-Methylnaphthalene	45-105	≤ 30
2-Methylphenol (o-Cresol)	40-110	≤ 30
4-Methylphenol (p-Cresol)	30-110	≤ 30
Naphthalene	40-100	≤ 30
Nitrobenzene	45-110	≤ 30
2-Nitrophenol	40-115	≤ 30
4-Nitrophenol	0-125	≤ 30
n-Nitrosodimethylamine	25-110	≤ 30
n-Nitrosodi-n-propylamine	35-130	≤ 30
n-Nitrosodiphenylamine	50-110	≤ 30

Table 28-2. Method/SOP QC Acceptance Limits - Water

ANALYTE	Method/SOP QC Acceptance Limits	
QC Parameters	**MS/LCS (%R)**	**MSD (RPD)**
Pentachlorophenol	40-115	≤ 30
Phenanthrene	50-115	≤ 30
Phenol	0-115	≤ 30
Pyrene	50-130	≤ 30
2,4,6-Trichlorophenol	50-115	≤ 30
SVOC Surrogates		
2-Fluorophenol	20-110	Not applicable
2-Fluorobiphenyl	50-110	Not applicable
Nitrobenzene-d5	40-110	Not applicable
2,4,6-Tribromophenol	40-125	Not applicable
Terphenyl-d14	50-135	Not applicable
Aroclor 1260 by EPA Method 8082A		
Aroclor 1016	25-145	≤ 50
Aroclor 1260	30-145	≤ 50
Aroclor 1260 Surrogates		
Decachlorobiphenyl	40-135	Not applicable
TPH-purgeables by EPA Method 8015C		
Gasoline	70-130	≤ 20
TPH-purgeables Surrogates		
Bromofluorobenzene	75-125	Not applicable
TPH-extractables by EPA Method 8015C		
Diesel	50-150	≤ 30
Motor Oil	50-150	≤ 30
TPH-purgeables Surrogates		
Octacosane	60-140	Not applicable
o-Terphenyl	60-140	Not applicable
Metals by EPA Method 6010C		
Aluminum	80-120	≤ 20
Antimony	80-120	≤ 20
Arsenic	80-120	≤ 20
Barium	80-120	≤ 20
Beryllium	80-120	≤ 20
Cadmium	80-120	≤ 20
Chromium (total)	80-120	≤ 20
Cobalt	80-120	≤ 20
Copper	80-120	≤ 20
Lead	80-120	≤ 20
Manganese	80-120	≤ 20
Nickel	80-120	≤ 20
Selenium	80-120	≤ 20
Silver	80-120	≤ 20

Table 28-2. Method/SOP QC Acceptance Limits - Water

ANALYTE	Method/SOP QC Acceptance Limits	
QC Parameters	MS/LCS (%R)	MSD (RPD)
Thallium	80-120	≤ 20
Vanadium	80-120	≤ 20
Zinc	80-120	≤ 20
Mercury by EPA Method 7470A		
Mercury	85-115	≤ 20
Organic Lead by the DHS LUFT Method		
Organic lead	22-148 [1] 25-121 [2]	≤ 11 [1] ≤ 30 [2]

Notes

%R: percent recovery
MS/LCS: matrix spike/laboratory control sample
MSD: matrix spike duplicate
RPD: relative percent difference
MS/LCS: matrix spike/laboratory control sample
MS/LCS: matrix spike/laboratory control sample
PAHs: polycyclic aromatic compounds
QC: quality control
SIM: selective ion monitoring
SOP: standard operating procedure
SVOC: semivolatile organic compounds
TPH: total petroleum hydrocarbons
VOC: volatile organic compound

[1] Control limits for MS/MSD.
[2] Control limits for LCS/LCSD.

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SAP Worksheet #29 – Project Documents and Records Table

DOCUMENT	WHERE MAINTAINED
Field notes/logbook	KCH Project file
Chain-of-custody	KCH Project file
Laboratory raw data	APPL and Calscience, KCH Project file, NAVFAC Southwest administrative record
Field/analytical laboratory audit/assessment	KCH Project file, APPL, Calscience
Corrective action	KCH Project file, APPL and Calscience
Laboratory equipment maintenance logs	APPL and Calscience
Sample preparation	APPL and Calscience
Run logs	APPL and Calscience
Sample disposal	APPL and Calscience
Hard copy of analytical laboratory reports	KCH Project file, NAVFAC Southwest administrative record
Hard copy data validation reports	KCH Project file, NAVFAC Southwest administrative record

Note:

Files will be stored for a minimum of 7 years in accordance with the CLEAN contract requirement.

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SAP Worksheet #30 – Analytical Services Table

Matrix	Analytical Group	Sample Locations / ID Number	Analytical Method	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory / Organization (name and address, contact person and telephone number)
Soil & Water	VOCs	See WS #18	U.S. EPA 8260B	7 days (calendar)	Agriculture & Priority Pollutant Laboratories, Inc. (APPL) 908 North Temperance Ave. Clovis, CA 93611 Diane Anderson (559) 275-2175	Calscience Environmental Laboratories, Inc. (Calscience) 7440 Lincoln Way Garden Grove, CA 92841-1432 Steve Lane (714) 895-5494
Soil & Water	PAHs		U.S. EPA 8270D SIM			
Soil & Water	SVOCs		U.S. EPA 8270D			
Soil & Water	Aroclor 1260		U.S. EPA 8082A			
Soil & Water	TPH – purgeables		U.S. EPA 8015C			
Soil & Water	TPH – extractables		U.S. EPA 8015C			
Soil & Water	Metals [1]		U.S. EPA 6010C			
Soil	Mercury		U.S. EPA 7471B			
Water	Mercury		U.S. EPA 7470A			
Soil & Water	Organic Lead	See WS #18	DHS LUFT	7 days (calendar)	Calscience Environmental Laboratories, Inc. (Calscience) 7440 Lincoln Way Garden Grove, CA 92841-1432 Steve Lane (714) 895-5494	EMAX Laboratories, Inc. (EMAX) 1835 W. 205th Street Torrance, CA 90501 Jim Carter (310) 618-8889

Notes:

[1] Includes: copper, lead, and manganese.

General Notes:

All samples will be analyzed by laboratories that are accredited by the California Department of Public Health Services Environmental Laboratory Accreditation Program (ELAP), Naval Facilities Engineering Command / Engineering Service Center (NAVFAC ESC), and National Environmental Laboratory Accreditation Program (NELAP) to perform the requested analyses.

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SAP Worksheet #31 – Planned Project Assessments Table

Assessment Type	**Frequency**	**Internal or External**	**Organization Performing Assessment**	**Person(s) Responsible for Performing Assessment** (title and organizational affiliation)	**Person(s) Responsible for Responding to Assessment Findings** (title and organizational affiliation)	**Person(s) Responsible for Identifying and Implementing Corrective Actions (CA)** (title and organizational affiliation)	**Person(s) Responsible for Monitoring Effectiveness of CA** (title and organizational affiliation)
Field sampling Technical Systems Audit (TSA)	Once during sampling	Internal	KCH	Project QAO KCH	Field Manager KCH	Field Manager KCH	Project QAO KCH

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SAP Worksheet #32 – Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (name, title, organization)	Timeframe for Response
Field sampling Technical Systems Audit (TSA)	Audit Form showing results of field audit. If corrective actions are necessary and cannot be implemented during the audit, these deficiencies will be noted and their resolution will be documented in the Corrective Action Report (CAR). See attached audit form (Figure 32-1).	Gabe Fuson Field Manager KCH	As soon as possible within same day of finding.	Completed Audit Form indicating all corrective actions taken. Additional documentation will be attached as necessary. Audit form is issued by the Project QAO.	Gabe Fuson Field Manager KCH	1 business day
		Gary Goodemote CTO Manager KCH	1 business day		Gary Goodemote CTO Manager KCH	1 business day
		Artemis Antipas Program QAM KCH	1 business day		Artemis Antipas Program QAM KCH	3 business days
		Sarah Koppel RPM Navy	1 business day if corrective action involving >1 day delay is necessary		Sarah Koppel RPM Navy	Included with Technical Memorandum.

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Figure 32-1. Technical Systems Audit Form: Soil Boring/Sampling

KCH

TECHNICAL SYSTEMS AUDIT FORM: SOIL BORING/SAMPLING

Crew Members: ____________________

Date: ____________________
Time: ____________________

Boring/Sampling Location: ____________________
Work Activity: ____________________

	In Compliance? Yes	In Compliance? No	If "No" Corrective action taken (Attach additional documentation if necessary)
HEALTH & SAFETY			
APP/SSHP readily available			
Hard hats			
Steel-toed boots			
Safety vest			
Gloves			
Eye protection			
Air monitoring conducted in breathing zone			
Work area clearly deliniated			
DOCUMENTATION			
SAP onsite			
Boring log			
Field notebook			
Sample labels			
Chain of custody			
SOIL BORING			
Hand auger clean			
Soil sampler clean			
Boring location			
Boring log			
Total boring depth			
Soil classified to USCS			
Soil samples sealed appropriately			
Soil samples stored appropriately (cooler, ice, etc.)			
Depth to water (if applicable)			
OC samples collected			
Samples collected in correct containers			
Water samples collected in correct order by analysis			
VOC samples (in VOAs) free of bubbles			
IDW stored and labeled appropriately			

ADDITIONAL NOTES/COMMENTS:

QA/QC Reviewer: ____________

Signature: ____________________

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SAP Worksheet #33 -- QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (title and organizational affiliation)	Report Recipient(s) (title and organizational affiliation)
Data Quality Assessment • Overview of sampling, decontamination, and data storage procedures • Identifies quality control samples and summarizes associated analytical results • Summarizes the findings of the analytical data validation process • Provides an evaluation of data quality in accordance with the data quality indicators defined in the SAP	Once	October 31, 2009 Submitted as part of semiannual Technical Memorandum.	Program QAM, KCH Project QAO, KCH Project Chemist, KCH	Navy RPM

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SAP Worksheet #34 -- Verification (Step I) Process Table

Verification Input	Description	Internal / External	Responsible for Verification (name, organization)
COC records	COC records will be reviewed internally upon their completion and verified against the samples packed in the sample coolers. A copy of the COC record will be retained in the project file, and the original and remaining copies will be taped inside the cooler for shipment.	I	Field Manager, KCH
TSA report	Upon completion, a copy of the TSA report will be placed in the project file. If corrective actions are required, a copy of the documented corrective action taken will be attached to the TSA report in the project file. At the completion of the field sampling, the TSA report will be reviewed internally to document that appropriate corrective actions have been taken and that the Corrective Action Report is attached. If corrective actions have not been taken, the Project Manager will be notified that action will be taken.	I	Program QAM, KCH
Field notes/logbook	Field notes will be reviewed internally and placed in the project file. A copy of the field notes will be attached to the Technical Memorandum.	I	Field Manager, KCH
Laboratory data	Laboratory data packages will be verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal. Received data packages will be verified externally according to the SAP-specified analytical data validation procedures.	I, E	Project Chemist, analytical laboratories, and analytical data validators

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SAP Worksheet #35 -- Validation (Steps IIa and IIb) Process Table

Step IIa / IIb	Validation Input	Description	Responsible for Validation (name, organization)
Planning Documents			
IIa	Methods (sampling and analysis)	Establish that required sampling and analytical methods were implemented and that any deviations were noted. Evaluate whether proper procedures met performance criteria.	Program QAM, KCH Project QAO, KCH Project Chemist, KCH
IIa & IIb	Performance requirements (including QC criteria) for all inputs	Evaluate whether proper procedures met performance criteria and that any deviations were noted.	Program QAM, KCH Project QAO, KCH
IIa	Reporting forms	Establish that required information on sampling and analysis has been provided.	Project Manager, KCH
IIa	Sampling procedures, plans, location, maps, and sample ID numbers	Evaluate whether sampling plan was executed as specified, and sampling procedures were followed with respect to equipment and proper sampling support (i.e., techniques, equipment, *decontamination, volume, preservation, temperature, etc*).	Hydrogeologist Technical Lead, KCH Program QAM, KCH Project QAO, KCH Project Chemist, KCH
IIa	List of project-specific analytes	Establish that the project-specific analytes were reported as specified in governing documents (i.e., analytical method, contract, etc).	Project Chemist, KCH
Analytical Data Packages			
IIa	Case narrative	Establish that the proper communication procedures were implemented by laboratory personnel.	Data Validator (Environmental Data Validation, Inc. [EDV]) Project Chemist, KCH
IIa	Internal laboratory COC record	Establish that proper and complete traceability of data from sample collection to analytical data reporting has been documented on the COC record.	Data Validator (EDV) Project Chemist, KCH
IIa	Sample condition upon receipt, and storage records	Establish that the proper documentation procedures were implemented by laboratory sample custodian upon receipt of samples and subsequent storage/disposal.	Data Validator (EDV) Project Chemist, KCH
IIa	Sample chronology (time of receipt, extraction, and analysis)	Establish that the holding times were met as specified in the method, contract or procedure, and deviations were documented and appropriate notifications were made with approval to proceed.	Data Validator (EDV) Project Chemist, KCH

Step IIa / IIb	Validation Input	Description	Responsible for Validation (name, organization)
IIa	Identification of QC samples (sampling or lab, temporal, and spatial)	Establish that the frequency of the field and laboratory QC samples was performed in accordance with the method, contract, or procedure.	Data Validator (EDV) Project Chemist, KCH
IIa & IIb	Associated (batch or periodic) PT sample results	Evaluate the PT sample results against performance requirements as specified by the method, contract, or procedure.	Data Validator (EDV) Project QAO, KCH Project Chemist, KCH
IIa	Communication logs	Establish that the proper communication procedures were implemented by field and laboratory personnel.	Data Validator (EDV) Project QAO, KCH Project Chemist, KCH
IIa	Copies of laboratory notebook, records, prep sheets	Establish that the proper documentation was implemented by laboratory personnel.	Data Validator (EDV) Project Chemist, KCH
IIa	Corrective Action Reports	Establish that the proper reporting procedures were implemented from laboratory personnel to laboratory QAM.	Data Validator (EDV) Project Chemist, KCH
IIa & IIb	Definitions of laboratory qualifiers	Assess that the laboratory data qualifiers were defined and properly assigned per the method, contract, or procedure.	Data Validator (EDV) Project Chemist, KCH
IIa & IIb	Documentation of corrective action results	Establish that the corrective action procedures were implemented and the corrective action properly addressed by laboratory QAM.	Data Validator (EDV) Project QAO, KCH Project Chemist, KCH
IIa & IIb	Documentation of individual QC results (e.g., spike, duplicate, LCS)	Establish that the QC results were properly reported, and whether project performance criteria were met.	Data Validator (EDV) Project QAO, KCH Project Chemist, KCH
IIa & IIb	Documentation of laboratory method deviations	Evaluate whether deviations from laboratory methods impacted data, and if laboratory data qualifiers were assigned, if applicable.	Data Validator (EDV) Project Chemist, KCH
IIa & IIb	Electronic data deliverables (EDDs)	Assess whether required analytical data/values have been provided by the laboratory in the proper electronic data deliverable format.	Data Manager, KCH Project Chemist, KCH
IIa & IIb	Instrument calibration reports	Establish that instrument initial and continuing calibration had been performed per the method, contract, or procedure, and any deviations were documented.	Data Validator (EDV) Project Chemist, KCH
IIa	Laboratory name	Establish that analytical laboratories performing analysis are identified in analytical data reports.	Project Chemist, KCH

Step IIa / IIb	Validation Input	Description	Responsible for Validation (name, organization)
IIa	Laboratory sample identification numbers	Establish that unique laboratory sample identification numbers are used, and are traceable to each unique sample, including QC samples.	Data Validator (EDV) Project Chemist, KCH
IIa & IIb	QC sample raw data	Establish that QC samples (blanks, MS/MSD, LCS, surrogates, internal standards, etc.) were analyzed in accordance with the method, and met the performance criteria.	Data Validator (EDV) Project Chemist, KCH
IIa & IIb	QC summary information	Evaluate whether QC results met project performance criteria, and any deviations documented, and assess blank contamination in accordance with the "5x /10x rule".	Data Validator (EDV) Project Chemist, KCH
IIa & IIb	Raw data	Establish that sample preparation and analytical raw data (i.e., calculations, deviations, etc) are correct and complete.	Data Validator (EDV) Project Chemist, KCH
IIa & IIb	Reporting forms, completed with actual results	Assess whether accurate and complete transcription of analytical data (i.e., analytical instrument output to reporting form), and that quantitation limits were achieved.	Data Validator (EDV) Project Chemist, KCH
IIa	Signatures for laboratory sign-off (e.g. laboratory QAM)	Establish that each analytical data report was reviewed and signed by the laboratory QAM.	Data Validator (EDV) Project Chemist, KCH
IIa	Standards traceability records	Establish that standards and reagents used during sample preparation and analysis are traceable and meet method, contract, and procedural requirements.	Program QAM, KCH Project QAO, KCH Project Chemist, KCH
Sampling Documents			
IIa	COC records	Establish that the proper sample custody procedures were implemented by field personnel.	Field Manager, KCH
IIa	Communication logs	Establish that the proper communication procedures were implemented by field and laboratory personnel.	Program QAM, KCH Project QAO, KCH Field Manager, KCH Project Chemist, KCH
IIa & IIb	Corrective action reports (CARs)	Establish that the proper reporting procedures were implemented from field personnel to Program QAM.	Program QAM, KCH
IIa & IIb	Documentation of corrective action results	Establish that the proper reporting procedures were implemented by Program QAM.	Program QAM, KCH
IIa & IIb	Documentation of deviation from methods	Evaluate whether deviations from sampling and field methods impacted data.	Program QAM, KCH Project QAO, KCH

Step IIa / IIb	Validation Input	Description	Responsible for Validation (name, organization)
IIa & IIb	Documentation of internal QA review	Establish that field and sampling procedures were implemented in accordance with the method, contract, or procedure, and deviations were documented.	Project QAO, KCH
IIa	EDDs	Assess whether required field data/values have been provided in the proper electronic data deliverable format.	Project Chemist, KCH Data Manager, KCH
IIa & IIb	Identification of QC samples	Establish that QC samples were collected in accordance with the method, contract, or procedure.	Project Chemist, KCH
IIa & IIb	Sampling instrument decontamination records	Establish that proper decontamination procedures were implemented by field sampling personnel.	Field Manager, KCH
IIa	Field instrument calibration logs	Establish that field instrumentation requiring calibration was calibrated in accordance with the method, manufacturer's manual, or procedure.	Field Manager, KCH
IIa & IIb	Sampling location and plan	Establish that required sampling locations and sample collection was performed in accordance with the sampling plan.	CTO Manager, KCH
IIa & IIb	Sampling notes	Evaluate whether sampling information was recorded correctly and completely on sampling forms, and any deviations were documented.	Field Manager, KCH
IIa & IIb	Sampling report (from field team leader to project manager describing sampling activities)	Evaluate whether deviations occurred and potential impact to data.	Field Manager, KCH
External Reports			
IIa & IIb	External audit report	Review laboratory audit reports, accreditation and certification records for the laboratory's performance on specific methods.	Program QAM, KCH Project QAO, KCH
IIa	External PT sample results	Evaluate the PT sample results against performance requirements as specified by the method, contract, or procedure.	Program QAM, KCH Project QAO, KCH
IIa	Laboratory assessment	Establish that the laboratory is in compliance with the current QA Manual, accreditation and certification requirements, and regulatory requirements.	Program QAM, KCH Project QAO, KCH
IIa	Laboratory QA plan	Establish that the laboratory has a current QA Manual, and has been prepared in accordance with regulatory requirements.	Project QAO, KCH
IIa & IIb	MDL study information	Establish that the laboratory has performed MDL studies on each instrument annually or in accordance with the method, contract, or procedure.	Project QAO, KCH

Step IIa / IIb	Validation Input	Description	Responsible for Validation (name, organization)
IIa	ELAP and NELAP accreditations	Establish that the laboratory has current ELAP and NELAP accreditations for the analyses to be performed.	Project QAO, KCH

Note:

In accordance with NAVFAC Southwest Environmental Work Instruction No. 1: Chemical Data Validation" (Navy, 2001) for sites listed on the U.S. EPA's National Priorities List, 20 percent of the data will be subjected to Level IV validation and the remaining 80 percent of the data will be subjected to Level III validation, as described in the Work Instruction. The selection of samples for Level III or Level IV validation will be consistent with the approach detailed in the Work Instruction.

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SAP Worksheet #36 –Analytical Data Validation (Steps IIa and IIb) Summary Table

Step IIa / IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (title and organizational affiliation)
IIa	Soil & Water	BTEX, MTBE, and naphthalene	GC/MS Analysis by U.S. EPA Method 8260B, Rev. 24, 06/15/09. CTO 003 SAP (2009). NAVFAC Southwest Environmental Work Instruction no. 1.	Project Manager Environmental Data Validation, Inc. (EDV)
IIa	Soil & Water	SVOCs/PAHs	Polycylic Aromatic Hydrocarbons by SIM, Rev. 0, 06/16/09. Semivolatile Organic Compounds by EPA Method 8270D, Rev. 0, 06/16/09. CTO 003 SAP (2009). NAVFAC Southwest Environmental Work Instruction no. 1.	Project Manager EDV
IIa	Soil & Water	Aroclor 1260	PCBs and Congeners by U.S. EPA Method 8082A, Rev. 0, 07/28/09. CTO 003 SAP (2009). NAVFAC Southwest Environmental Work Instruction no. 1.	Project Manager EDV
IIa	Soil & Water	Metals [1]	ICP-AES by U.S. EPA Method 6010C, Rev. 1, 07/24/09. CTO 003 SAP (2009). NAVFAC Southwest Environmental Work Instruction no. 1.	Project Manager EDV
IIa	Soil	Mercury	Analysis of Hg in Soils by U.S. EPA Method 7471B, Rev. 0, 06/17/09. CTO 003 SAP (2009). NAVFAC Southwest Environmental Work Instruction no. 1.	Project Manager EDV
IIa	Water	Mercury	Analysis of Hg in Soils by U.S. EPA Method 7470A, Rev. 18, 04/11/09. CTO 003 SAP (2009). NAVFAC Southwest Environmental Work Instruction no. 1.	Project Manager EDV

Step IIa / IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (title and organizational affiliation)
IIa	Soil & Water	Organic Lead	Organic Lead (CADHS LUFT Method), Rev. 0 05/27/09. CTO 003 SAP (2009). NAVFAC Southwest Environmental Work Instruction no. 1.	Project Manager EDV
IIa	Soil & Water	TPH - extractables	Total Extractable Petroleum Hydrocarbons – Diesel, Rev. 0, 06/16/09. CTO 003 SAP (2009). NAVFAC Southwest Environmental Work Instruction no. 1.	Project Manager EDV
IIa	Soil & Water	TPH - purgeables	Total Petroleum Hydrocarbons by U.S. EPA Method 8015C; Rev. 7, 06/15/09. CTO 003 SAP (2009). NAVFAC Southwest Environmental Work Instruction no. 1.	Project Manager EDV
IIa	Soil	Percent Moisture	Percent Solids and Moisture, CLP Method 4.0, Rev. 10, 07/13/09. CTO 003 SAP (2009). NAVFAC Southwest Environmental Work Instruction no. 1.	Project Manager EDV

Note:

[1] Includes: copper, lead, and manganese.

SAP Worksheet #37 -- Usability Assessment

The usability assessment process will evaluate and document the usability of the data by considering the project data quality indicators (DQIs) or the precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS) parameters, and whether the data will be suitable for the intended needs of the project. Every data type (e.g., sampling, field screening data, and laboratory analytical data) will be relevant to the usability assessment. Data usability will include the entry of analytical data validation flags, applied by the third-party analytical data validation subcontractor, to the project data, as well as an overall assessment of the analytical data and field QC samples.

The assessment will consider each type of data, the relationship to the entire data set, and the adequacy of the data to fulfill the project DQOs. The sample delivery groups (SDGs) will be assessed for correctness, completeness and compliance to method-specific or project-specific QA/QC requirements, including the results of the independent analytical data validation process and contractual requirements. Analytical data validation will evaluate the data based on the PARCCS criteria defined in this SAP and other method-specific performance requirements. The overall assessment process will also evaluate based on the intended use of the data.

The intent of the data quality assessment process will be to establish the levels of precision, accuracy, reproducibility, completeness, comparability, sensitivity, and usability of the final results with respect to the project DQOs. Upon completion of analytical data validation, each data point will be assessed as non-qualified, qualified as estimated ("J" or "UJ"), or qualified as rejected ("R") based upon the acceptance criteria, and analytical data validation flags will be added to the project data. These parameters will be based upon the analytical data quality, and will encompass the DQIs established in this SAP. Qualification will be given according to each samples' SDG, and will be based on the SAP and applicable laboratory and data validation SOPs. Both analytical and contract compliance and completeness levels will then be assessed for each analytical parameter. Finally, the overall usefulness of the data will be established as related to the project DQOs.

Data Quality Indicators

The PARCCS criteria will be the qualitative and quantitative indicators of data quality. The PARCCS criteria will be defined and discussed below. Quantifiable criteria, known as measurement performance criteria, are presented in Worksheet #12.

Precision

Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision will be measured by collecting data using field and laboratory duplicates and matrix spike duplicate (MSD) samples. It will be expressed in terms of the relative percent difference (RPD) as follows:

$$RPD = \frac{|C_1 - C_2|}{(C_1 + C_2)/2} \times 100$$

where:

C_1 = concentration of sample or MS, and
C_2 = concentration of duplicate or matrix spike duplicate (MSD).

Accuracy

Accuracy is the degree of agreement of an observed measurement (or an average of the same measurement type) with an accepted reference or true value. Accuracy of analytical determinations will be measured using laboratory QC analyses such as laboratory control samples (LCSs), MSs, and surrogate spikes. Accuracy will be measured by evaluating the actual result against the known concentration added to a spiked sample and will be expressed as percent recovery (%R) as shown below:

$$\%R = \frac{S - U}{C_{sa}} \times 100$$

where:

S = Measured concentration of spiked aliquot,
U = Measured concentration of unspiked aliquot, and
C_{sa} = Concentration of spike added.

Representativeness

Representativeness is the reliability with which a measurement or measurement system reflects the true conditions under investigation. Representativeness is influenced by the number and location of the sampling points, sampling timing and frequency of monitoring efforts, and the field and laboratory procedures. The representativeness of data will be maintained by the use of established field and laboratory procedures and their consistent application.

Comparability

Comparability expresses the confidence with which one data set can be compared to another based on using U.S. EPA-defined procedures, where available. If U.S. EPA procedures are not available, the procedures have been defined or referenced in this SAP.

The comparability of data will be established through well-documented methods and procedures, standard reference materials, QC samples, and performance-evaluation study results as well as by reporting each data type in consistent units.

Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions.

Analytical data validation and data quality assessment will determine which data will be valid and which data will be rejected. Percent completeness will be defined as follows:

$$Percent\ Completeness = \frac{V}{T} \times 100$$

where:

V = Number of valid (not rejected) measurements over a given time, and
T = Total number of planned measurements.

For this project, the completeness goal for this project will be 90 percent for validated analytical data.

Sensitivity

Sensitivity is the measure of a concentration at which an analytical method can positively identify and report analytical results. The sensitivity of an analytical method will be indicated by the project-required quantitation limits (QLs) and method detection limits (MDLs), as compared to the PALs.

Detection and Quantitation Limits

The MDL is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence from background noise for a specific analytical method. The QL represents the lowest concentration of an analyte that can be quantified within specified limits of precision and accuracy during routine laboratory operating conditions in a sample matrix. The QLs are contractually specified minimum quantitation limits for specific analytical methods and sample matrices, such as soil or water, and will typically be several times the MDL to allow for sample matrices.

Selected analytical methods and associated QLs are typically capable of quantifying contaminants of concern at concentrations below the most stringent screening criteria. The QLs will reflect the maximum sensitivity of current, routinely used analytical methods.

For this project, samples will be reported as estimated values ("J" qualified) if the concentrations are less than the QLs but greater than the MDLs.

Describe the evaluative procedures used to assess overall measurement error associated with the project:

The usability assessment process will consist of reviewing the analytical data validation reports for both usable analytical data (i.e., no validation qualifications or estimated "J"/"UJ" qualifications) and rejected ("R" qualified) analytical data, as well as evaluating the field and analytical data for discrepancies or deviations. This assessment will evaluate the impact of the discrepancies or deviations on the usability of the data and assesses whether the necessary information has been provided for the use in the decision making process. The assessment will evaluate whether there were deviations in sampling activities (e.g., incorrect sample location, improper of malfunctioning sampling equipment, or incorrect analysis performed), COC documentation, or holding times; compromised samples (i.e., damaged or lost samples) and the need to resample; or changes to SOPs or methods that could potentially impact data quality.

An evaluation of QC sample results will be performed to assess whether unacceptable QC results (e.g., blank contamination) impact data usability.

Other parameters to be evaluated during the usability assessment may include, but will not be limited to, the following:

- Matrix effects – matrix conditions that might have impacted the performance of the extraction or analytical method.
- Site conditions – unusual weather conditions or site conditions that might have affected the sampling plan.
- Identifying critical and non-critical samples or target analytes.
- Background or historical data.
- Data restrictions - data that do not meet the project DQOs or were "R" qualified might be restricted, but usable, as qualitative values for limited decision-making purposes.

The data will be evaluated for overall PARCCS criteria for each matrix, analytical group, and concentration level, and data use limitations will be discussed in the Quality Control Summary Report for data that do not meet the project DQOs or DQIs.

Identify the personnel responsible for performing the usability assessment:

Patricia Walters, Project Chemist, KCH

Maxine Walters, Analytical Data Validation Principal Chemist,
Environmental Data Validation, Inc.

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented, so that they identify trends, relationships (correlations), and anomalies:

Usability assessment results will be reported in the quality control summary section of the technical report.

References

American National Standards Institute (ANSI) /American Society for Quality (ASQ) E4-2004, 2004. "Quality Systems for Environmental Data and Technology Programs."

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State of California, DHS LUFT Task Force, 1989. "Leaking Underground Fuel Tank Field Manual: Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Closure, October.

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Appendix B

Background Information Provided by the Navy

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TABLE E-1: Summary of Recommendations for Evaluation of Soil Under Buildings at Parcel C
Evaluation of Soil Under Building Cover, Parcel C, Hunters Point Shipyard

Building	Proposed Sampling Location	Proposed Sample Depths[1]	Chemical of Potential Concern	Potential Source	Recommendation	Rationale
134	134-S-01	0 to 10 feet bgs	Copper, PAHs	Fuel line (Fuel Line D) located north and east of Building 134 was removed in 2001. Some metals also occur naturally in soils and bedrock at the site.	Collect samples from 2 sampling locations within the building footprint adjacent to 4600SW31 (Figure A-1). The Navy will conduct best effort to collect samples which may not be possible due to the building's low ceiling clearance.	No data within building footprint adjacent to removed location 4600SW31 with concentration of copper >10X RG (Figure 1-1).
	134-S-02	0 to 10 feet bgs	Copper, PAHs			
203	203-S-01	0 to 2-3 feet bgs (anticipated bedrock depth)	PAHs, naphthalene (as VOC)	Boiler, adjacent former UST (S-212) which historically contained boiler oil.	Additional sampling underneath the building west of 290104N2B (Figure A-2).	No data within building footprint adjacent to locations with concentration of COCs >4X RG.
	203-S-02	0 to 2-3 feet bgs (anticipated bedrock depth)	Copper, manganese, mercury, PAHs	Boiler, adjacent former UST (S-212) which historically contained boiler oil.	Additional sampling underneath the building west of 290104S1A Figure A-2).	No data within building footprint adjacent to locations with concentration of COCs >2X RG.
	203-S-03	0 to 3-4 feet bgs (anticipated bedrock depth)	Copper, organic lead, Aroclor 1260	Boiler; building contained transformers and was used as a power plant.	Additional sampling underneath the building west of 290106W4C and 290106W4A (Figure A-2).	No data within building footprint adjacent to locations with concentration of COCs >2X RG.
	203-S-04	0 to 4-5 feet bgs (anticipated bedrock depth)	Copper, organic lead, PAHs, naphthalene (as VOC)	Boiler; heavily oil-stained floor of a former industrial kiln located southeast of the building.	Additional sampling underneath the building north of 290109N2C (Figure A-2).	No data within building footprint adjacent to locations with concentration of COCs >2X RG.
	203-S-05	0 to 4-5 feet bgs (anticipated bedrock depth)	Copper, lead, manganese, Aroclor 1260	Boiler; heavily oil-stained floor of a former industrial kiln located southeast of the building.	Additional sampling underneath the building north of 290109W4A and 209109N2B (Figure A-2).	No data within building footprint adjacent to locations with concentration of COCs >2X RG.
	203-S-06	0 to 4-5 feet bgs (anticipated bedrock depth)	Organic lead, PAHs, naphthalene (as VOC), TPH, BTEX	Adjacent to former UST (UST-203) which historically contained gasoline.	Additional sampling underneath the building north of former UST S-203 (Figure A-2).	No data within building footprint adjacent to former UST which historically contained gasoline.
	203-S-07	0 to 4-5 feet bgs (anticipated bedrock depth)	Aroclor 1260	Building contained transformers and was used as a power plant.	Additional sampling underneath the building north of 290109W10C (Figure A-2).	No data within building footprint adjacent to locations with concentration of Aroclor 1260 >2X RG.
	203-S-08	0 to 4-5 feet bgs (anticipated bedrock depth)	Manganese	Unknown; adjacent corner of building was a former office	Additional sampling underneath the building east of 290109W12A (Figure A-2).	No data within building footprint adjacent to locations with concentration of manganese >2X RG.
	203-STEP-01	0 to 2-3 feet bgs (anticipated bedrock depth)	Copper, manganese, mercury, PAHs, naphthalene (as VOC)	See potential source for 203-S-01 and 203-S-02.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-02	0 to 2-3 feet bgs (anticipated bedrock depth)	Copper, manganese, mercury, PAHs	See potential source for 203-S-02.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-03	0 to 3-4 feet bgs (anticipated bedrock depth)	Copper, organic lead, Aroclor 1260	See potential source for 203-S-03.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-04	0 to 3-4 feet bgs (anticipated bedrock depth)	Copper, organic lead, Aroclor 1260	See potential source for 203-S-03.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-05	0 to 4-5 feet bgs (anticipated bedrock depth)	Copper, organic lead, PAHs, naphthalene (as VOC)	See potential source for 203-S-04.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-06	0 to 4-5 feet bgs (anticipated bedrock depth)	Copper, lead, manganese, organic lead, PAHs, naphthalene (as VOC), Aroclor 1260	See potential source for 203-S-04 and 203-S-05.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-07	0 to 4-5 feet bgs (anticipated bedrock depth)	Copper, lead, manganese, Aroclor 1260	See potential source for 203-S-05.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-08	0 to 4-5 feet bgs (anticipated bedrock depth)	Organic lead, PAHs, naphthalene (as VOC), TPH, BTEX	See potential source for 203-S-06.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample

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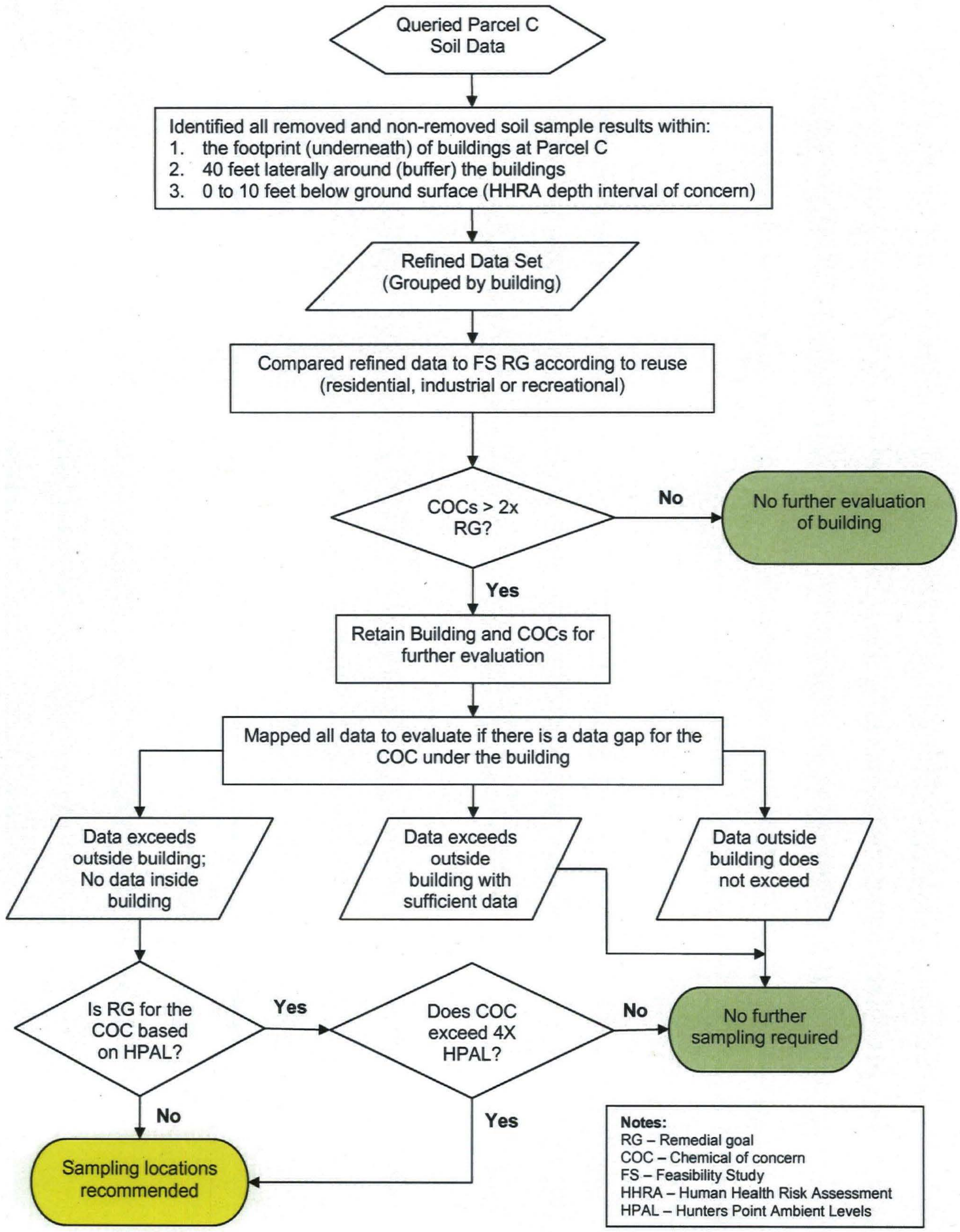
TABLE E-1: Summary of Recommendations for Evaluation of Soil Under Buildings at Parcel C
Evaluation of Soil Under Building Cover, Parcel C, Hunters Point Shipyard

Building	Proposed Sampling Location	Proposed Sample Depths[1]	Chemical of Potential Concern	Potential Source	Recommendation	Rationale
203	203-STEP-09	0 to 4-5 feet bgs (anticipated bedrock depth)	Organic lead, PAHs, naphthalene (as VOC), TPH, BTEX	See potential source for 203-S-06.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-10	0 to 4-5 feet bgs (anticipated bedrock depth)	Aroclor 1260	See potential source for 203-S-07.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-11	0 to 4-5 feet bgs (anticipated bedrock depth)	Aroclor 1260	See potential source for 203-S-07.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-12	0 to 4-5 feet bgs (anticipated bedrock depth)	Manganese	See potential source for 203-S-08.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
	203-STEP-13	0 to 4-5 feet bgs (anticipated bedrock depth)	Manganese	See potential source for 203-S-08.	Collect step-out samples 10 feet from the sampling location with results exceeding RG towards the interior of the building.	Step-out sample
217	None		None	None	No further evaluation	COCs were sampled for underneath the building.
231E	231E-S-01	0 to 10 feet bgs	Lead	Unknown; about 60 feet west of former UST (HPA-12) which historically contained diesel	Additional sampling underneath the building south of IR28B105 (Figure A-4).	No data within building footprint adjacent to location (IR28B105) with concentration of lead exceeding risk-based RG.
	231E-S-02	0 to 10 feet bgs	Lead, PAHs	Sump; adjacent former UST (HPA-17) which historically contained diesel	Additional sampling underneath the building south of 280101BC13 (Figure A-4).	No data within building footprint adjacent to location (280101BC13) with concentration of PAH exceeding 2X RG. A former UST (HPA-17) adjacent to the building historically contained diesel but no available lead and PAH data immediately adjacent to the UST within the building footprint.
	231E-S-03	0 to 10 feet bgs	PAHs	Floor vault	Additional sampling underneath the building northwest of 280104W3A (Figure A-4).	PAH concentration in 280104W3A exceeded 10X RG. This location was removed during a previous excavation; however, no sample was collected within the building footprint adjacent to the exceedance (Figure 4-3).
231W	None		None	None	No further evaluation	COCs were sampled for underneath the building.
241	None		None	None	No further evaluation	COCs were sampled for underneath the building.
251	None		None	None	No further evaluation	COCs were sampled for underneath the building.
253	None		None	None	No further evaluation	COCs were sampled for underneath the building.
258	None		None	None	No further evaluation	COCs were sampled for underneath the building.
272	None		None	None	No further evaluation	COCs were sampled for underneath the building.
275	None		None	None	No further evaluation	COCs were sampled for underneath the building.
281	None		None	None	No further evaluation	COCs were sampled for underneath the building.

Notes:
1 Samples will be collected starting at 0.5 foot below ground surface (bgs) at 2-foot intervals.

AST Aboveground storage tank
bgs Below ground surface
BTEX Benzene, toluene, ethylbenzene, xylene
COC Chemicals of concern
PAH Polycyclic aromatic hydrocarbon
RG Remediation goal
TPH Total petroleum hydrocarbon
UST Underground storage tank
VOC Volatile organic compound

FIGURE E-1: DECISION TREE FOR EVALUATION OF SOIL DATA UNDER PARCEL C BUILDINGS
EVALUATION OF SOIL UNDER BUILDING COVER, PARCEL C, HUNTERS POINT SHIPYARD



Building	**134**
Potential Source	Former dip tank, sump, former tank farm, fuel lines, dip tank, and machine shop operations
COC (Conc>2x RG)	Copper Lead Manganese Zinc Polycyclic aromatic hydrocarbons (PAHs) 1,4-Dichlorobenzene (1,4-DCB) 1,2-Dichloroethane (1,2-DCA) Tetrachloroethene (PCE) Trichloroethene (TCE) Vinyl chloride Naphthalene Aroclor 1260
Evaluation Summary	Locations of copper concentrations exceeding remediation goal (RG) are either within previous or proposed Feasibility Study (FS) excavations. The copper exceedances are also bounded by non-detects (NDs) except for 4600SW31, which does not have a sample location directly adjacent to it within the building footprint (Figure 1-1).
	One of the three locations that exceeded lead RG exceeded by 4X RG; however, this location was removed during a previous excavation and bounded by NDs (Figure 1-2). No further evaluation for lead.
	Manganese were sampled at locations within the building footprint adjacent to concentrations exceeding RGs. Manganese concentrations detected underneath the building were either ND or <2X RG except for 460W1BB which was <4X RG (Figure 1-3). No further evaluation for manganese.
	Locations of zinc concentrations exceeding RG are either within previous or proposed FS excavations. The zinc exceedances were bounded by NDs and were all removed (Figure 1-4). No further evaluation for zinc.
	One location analyzed for PAH exceeded 10X RG but is within a proposed FS excavation and bounded by NDs (Figure 1-5). All other PAH exceedance were either removed or bounded by NDs except for 4600SW31, which does not have a sample location directly adjacent to it within the building footprint.
	Locations of 1,4-DCB concentration exceeding RG are bounded by NDs except for IR25SG045 (Figure 1-6). 1,4-DCB concentrations underneath the building have been identified. No further evaluation for 1,4-DCB.
	Three locations of 1,2-DCA had concentrations exceeding RG (10X) but are bounded by NDs (Figure 1-7). 1,2-DCA concentrations underneath the building have been identified. No further evaluation for 1,2-DCA.
	Locations of PCE concentration exceeding RG are bounded by NDs except for IR25SG045 (Figure 1-8). PCE concentrations underneath the building have been identified. No further evaluation for PCE.
	TCE concentrations underneath the building have been identified. Locations with TCE concentrations exceeding RG are either bounded by NDs, within or adjacent to SVE areas (Figure 1-9). No further evaluation for TCE.
	Vinyl chloride concentrations underneath the building have been identified. Locations with vinyl chloride concentrations exceeding RG are either bounded by NDs, or within SVE areas (Figure 1-10). No further evaluation for vinyl chloride.
	Locations of naphthalene concentration exceeding RG are bounded by NDs except for IR25SG058 (Figure 1-11). Naphthalene concentrations underneath the building have been identified. No further evaluation for naphthalene.
	Locations of Aroclor 1260 concentrations exceeding RG are either within previous or proposed FS excavations. The Aroclor 1260 exceedances were bounded by NDs (Figure 1-12). No further evaluation for Aroclor 1260.
Recommendation	Collect 2 samples (134-S-01 and 134-S-02) within the building footprint adjacent to 4600SW31 (Figure A-1) and analyze for copper and PAHs.
Rationale	No data within building footprint adjacent to removed location with concentration of copper >10X RG and PAHs >2X RG.

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Building	203
Potential Source	Transformers Power plant Boiler room Adjacent former USTs, ASTs, fuel lines Former industrial kiln located southeast of the building
COC (Conc>2x RG)	Arsenic Copper Lead Organic lead Manganese Mercury Zinc PAHs Naphthalene Aroclor 1254 Aroclor 1260
Evaluation Summary	Bedrock in this area is to 5 feet MSL.
	Arsenic concentrations adjacent to the east, southeast corner, and southwest corner of the building exceed <2X RG, which is based on HPAL and may not warrant action. All other concentrations of arsenic exceeding RG are bounded by NDs (Figure 2-1). No further evaluation for arsenic.
	Copper concentrations exceeding at least 2X RG are located adjacent to the eastern and southeastern side of the building (Figure 2-2). Additional sampling within the building footprint adjacent to these locations is recommended.
	A location (290109N2B) with lead concentration exceeding 2X RG is located adjacent to the southeastern side of the building (Figure 2-3). Additional sampling within the building footprint adjacent to this location is recommended.
	Organic lead exceeded at least 4X RG at 2 locations (290106W4C and 290106W4A) adjacent to the building (Figure 2-4). Additional sampling within the building footprint adjacent to these locations is recommended. No data was available within the building footprint adjacent to this former UST (UST-203) which historically contained gasoline; therefore, additional sampling is recommended for organic lead at this location.
	Manganese concentrations exceeding at least 2X RG were located adjacent to the east, southeast, and southwest of the building (Figure 2-5). Additional sampling within the building footprint adjacent to these locations is recommended.
	Mercury concentrations exceeding 2X RG were located adjacent to the eastside of the building (Figure 2-6). Additional sampling within the building footprint adjacent to these locations is recommended.
	Zinc concentrations adjacent to the east and southeast corner of the building exceed <2X RG, which is based on HPAL and may not warrant action. All other concentrations of zinc exceeding RG are bounded by NDs (Figure 2-7). No further evaluation for zinc.
	PAHs exceeded at least 4X RG at 2 locations (290104N2B and PA49TA05) adjacent to the building (Figure 2-8). Additional sampling within the building footprint adjacent to these locations is recommended. No data was available within the building footprint adjacent to a former UST (UST-203) which historically contained gasoline; therefore, additional sampling is recommended for PAHs at this location.
	Naphthalene concentration exceeded 4X RG in one location (290104N2B) adjacent to the building (Figure 2-9). Additional sampling within the building footprint adjacent to this location is recommended. No data was available within the building footprint adjacent to a former UST (UST-203) which historically contained gasoline; therefore, additional sampling is recommended for naphthalene at this location.
	One location analyzed for Aroclor 1254 exceeded 10X RG but is within a previous excavation, removed and bounded by NDs (Figure 2-10). All other Aroclor 1254 exceedance were either removed or bounded by NDs. No further evaluation for Aroclor 1254.
	Three locations adjacent to the building had concentrations of Aroclor 1260 exceeding at least 2X RG (Figure 2-11). Additional sampling within the building footprint adjacent to these locations is recommended. All other exceedances were within previous excavations, removed, and bounded by NDs.
Recommendation	Additional sampling underneath the building at the following locations (Figure A-2): West of 290104N2B (203-S-01) - PAHs, naphthalene (as VOC) West of 290104S1A (203-S-02) - Copper, manganese, mercury, PAHs West of 290106W4C and 290106W4A (203-S-03) - Copper, organic lead, Aroclor 1260 North of 290109N2C - Copper, organic lead, PAHs, naphthalene (as VOC) North of 290109W4A and 209109N2B (203-S-05) - Copper, lead, manganese, Aroclor 1260 North of former UST S-203 (203-S-06) - Organic lead, PAHs, naphthalene (as VOC), TPH, BTEX North of 290109W10C (203-S-07) - Aroclor 1260 East of 290109W12A (203-S-08) - Manganese Collect step-out samples 10 feet towards the interior of the building (see Figure A-2).
Rationale	No data within building footprint adjacent to locations with concentration of COCs >2X RG and former gasoline UST.

Building	**217**
Potential Source	Former sheet metal production, photoengraving, welding, and painting site.
COC (Conc>2x RG)	Arsenic Copper Lead Manganese Zinc PAHs Benzene
Evaluation Summary	One location (IR29B039) adjacent to the westside of the building had arsenic concentration exceeding <2X RG, which is based on HPAL and may not warrant action. All other concentrations of arsenic exceeding RG were removed and bounded by NDs (Figure 3-1). No further evaluation for arsenic.
	Copper concentrations exceeding RG were removed and bounded by NDs (Figure 3-2). No further evaluation for copper.
	Lead concentrations exceeding RG were removed and bounded by NDs (Figure 3-3). No further evaluation for lead.
	One location (IR29B039) adjacent to the westside of the building had manganese concentration exceeding 2X RG. All other concentrations of manganese exceeding RG were removed and bounded by NDs except for PA29SS08 located underneath the building (Figure 3-4). Manganese concentration in PA29SS08 was <2X RG, which is based on HPAL and may not warrant action. No further evaluation for manganese.
	Zinc concentrations exceeding RG were removed and bounded by NDs (Figure 3-5). No further evaluation for zinc.
	Only one location had PAH concentrations exceeding RG (Figure 3-6). This location was removed and bounded by NDs. No further evaluation for PAHs.
	Two of the 3 locations exceeding benzene RG had benzene concentrations exceeding 10X RG (Figure 3-7). These 3 locations are within a proposed FS excavation and bounded by NDs. No further evaluation for benzene.
Recommendation	No further evaluation
Rationale	COCs were sampled for underneath the building.
Building	**231E**
Potential Source	Heavy industrial machining. The building housed several air treatment systems, sumps, sandblasting rooms, a boiler, and subfloor trenches and piping and adjacent to five former USTs.
COC (Conc>2x RG)	Arsenic Lead PAHs
Evaluation Summary	Arsenic concentrations underneath the building have been identified. Arsenic concentrations within the building footprint adjacent to a location (280101BC13) adjacent to the northeast corner of the building which exceeded <2X RG were below RG (Figure 4-1). No further evaluation for arsenic.
	Lead concentrations underneath the building have been identified. Two locations (IR28B105 and IR28B137) adjacent to the building had lead concentrations which exceed <2X RG (Figure 4-2). Additional sampling within the building footprint adjacent to these locations is recommended. All other lead exceedance were removed and bounded by NDs or concentrations below RG.
	PAH concentrations underneath the building have been identified. A former UST (HPA-17) adjacent to the building historically contained diesel but no available PAH data immediately adjacent to the UST within the building footprint. PAH concentration in 280104W3A exceeded 10X RG; this location was removed during a previous excavation. PAH concentration in 280101BC13 exceeded 2X RG. No samples were collected within the building footprint adjacent to these locations exceeding at least 2X RG (Figure 4-3).
Recommendation	Additional sampling underneath the building at the following locations (Figure A-4): South of IR28B105 (231E-S-01) - Lead South of 280101BC13 and UST HPA-17 (231E-S-02) - Lead, PAHs Northwest of 280104W3A (231E-S-03) - PAHs
Rationale	No data within building footprint adjacent to locations with concentration of COCs >2X RG and former diesel UST.
Building	**231W**
Potential Source	Sandblasting rooms Sumps Subfloor trenches/piping Wooden floor soaked with oil
COC (Conc>2x RG)	Arsenic Lead PAHs Vinyl chloride
Evaluation Summary	All COC exceedances are within the proposed FS excavation or were removed during previous excavation. COC exceedances underneath the building are laterally bounded (Figures 5-1 to 5-3).
Recommendation	No further evaluation
Rationale	COCs were sampled for underneath the building.

Building	**241**
Potential Source	Former forge shop and metal heat treating facility which contained sumps, vats for oil, and had two associated ASTs.
COC (Conc>2x RG)	Copper Lead Manganese Nickel Zinc Benzene Naphthalene Pesticides
Evaluation Summary	All COC exceedances are within previous or proposed FS excavations, removed, or bounded by NDs or concentrations below RGs except for PA30B016 (Figures 6-1 to 6-11). Nickel concentration in PA30B016 was <2X RG, which is based on HPAL and may not warrant action. All COCs were sampled for underneath the building.
Recommendation	No further evaluation
Rationale	COCs were sampled for underneath the building.
Building	**251**
Potential Source	Dip tanks and sumps are located in the northern portion of the building. The dip tanks contained TCE that was used to strip paint from metal.
COC (Conc>2x RG)	Arsenic 1,4-DCB Aroclor 1260
Evaluation Summary	All COC exceedances are within the proposed FS excavation except for 3 locations (IR28B278, IR28MW299B, and IR28B285) with arsenic concentrations exceeding <2X RG, which is based on HPAL and may not warrant action. All COCs were sampled for underneath the building and are bounded by NDs or concentrations below RGs (Figures 7-1 to 7-3).
Recommendation	No further evaluation
Rationale	COCs were sampled for underneath the building.
Building	**253**
Potential Source	Machining, welding, assembly, painting, repair, and fabrication of a variety of electronic, optical, and ordnance-related equipment. Two sumps, one large and two small paint booths, two large dip tanks, one large vapor degreaser, resin impregnation tanks, and a parts washer. Removed tanks which primarily stored gasoline and diesel fuel, although results for samples from some of the tanks also indicated they stored solvents.
COC (Conc>2X RG)	Benzene
Evaluation Summary	One sample location (9420AS9A) exceeded benzene >4X RG. This sampling location is adjacent to one of the former USTs on the northwestern side of the building (Figure 8-1). This single exceedance is within the proposed FS excavation and bounded by NDs. Benzene was not detected underneath the building except for 1 location (IR28SG422) which had benzene concentration below RG.
Recommendation	No further evaluation.
Rationale	No other COCs except for benzene which aside for 1 location which was below RG was not detected underneath the building.
Building	**258**
Potential Source	Pipe manufacturing facility where sulfuric, chromic, and hydrochloric acids, sodium hydroxide, and degreasing solvents were used. Former open pickling and degreasing operation with eleven concrete and metal dip tanks and their associated drainage sumps.
COC (Conc>2x RG)	Cadmium Copper Manganese Zinc PAHs 1,4-DCB PCE TCE Aroclor 1260
Evaluation Summary	All COCs were sampled for underneath the building where a source was identified (Figures 9-1 to 9-9). All exceedances were bounded by NDs or concentrations below RGs except for manganese. Unbounded locations of manganese exceeded <2X RG, which is based on HPAL and may not warrant action.
Recommendation	No further evaluation
Rationale	COCs were sampled for underneath the building.

Building	**272**
Potential Source	Riggers shop. A sump located in the northeastern corner of Building 272 formerly drained into an oil and grease trap in the alley between Buildings 272 and 281. A waste oil tank, and associated floor drains and sewer lines in the northern portion of Building 272.
COC (Conc>2x RG)	Arsenic Copper Lead Organic lead Manganese Mercury Thallium Zinc PAHs PCE TCE
Evaluation Summary	All COCs were sampled for underneath the building (Figures 10-1 to 10-10).
Recommendation	No further evaluation
Rationale	COCs were sampled for underneath the building.
Building	**275**
Potential Source	Sheet Metal Fabrication Facility Aluminum Casting Shop
COC (Conc>2x RG)	Arsenic Cadmium Copper Manganese Thallium Vanadium Zinc
Evaluation Summary	All COCs were sampled for underneath the building (Figures 11-1 to 11-7).
Recommendation	No further evaluation
Rationale	COCs were sampled for underneath the building.
Building	**281**
Potential Source	Electronics-Weapons Precision Facility Machine Shop, contained a paint room with five steel dip tanks UST HPA-33 contained chlorinated solvents UST HPA-34 contained solvents Sump and vault/pit
COC (Conc>2x RG)	Arsenic Copper Manganese Mercury PAHs PCE Aroclor 1260
Evaluation Summary	Arsenic concentrations exceeding RG (Figure 12-1) were within previous excavation, removed, or bounded by NDs except for 1 location (280801N4A) containing arsenic at concentrations <2X RG, which is based on HPAL and may not warrant action. No further evaluation for arsenic. All COCs were sampled for underneath the building (Figures 12-2 to 12-5).
Recommendation	No further evaluation
Rationale	COCs were sampled for underneath the building.

Note: Buildings highlighted in yellow are recommended for additional sampling. Buildings highlighted in green are recommended for no further evaluation.

TABLE E-3: Chemicals of Concern Evaluated for Soil Under Buildings at Parcel C
Evaluation of Soil Under Building Cover, Parcel C, Hunters Point Shipyard

FOR DISCUSSION PURPOSES ONLY
May 19, 2009

	Metals													PAHs							VOCs							PCBs		Pesticides				SVOCs
Building	ANTIMONY	ARSENIC	CADMIUM	COPPER	IRON	LEAD	ORGANIC LEAD	MANGANESE	MERCURY	NICKEL	THALLIUM	VANADIUM	ZINC	BENZO(A)ANTHRACENE	BENZO(B)FLUORANTHENE	BENZO(K)FLUORANTHENE	BENZO(A)PYRENE	CHRYSENE	DIBENZ(A,H)ANTHRACENE	INDENO(1,2,3-CD)PYRENE	1,4-DICHLOROBENZENE	1,2-DICHLOROETHANE	BENZENE	TETRACHLOROETHENE	TRICHLOROETHENE	VINYL CHLORIDE	NAPHTHALENE	AROCLOR-1254	AROCLOR-1260	DIELDRIN	GAMMA-BHC (LINDANE)	HEPTACHLOR EPOXIDE	HEPTACHLOR EPOXIDE B	BIS(2-ETHYLHEXYL)PHTHALATE
134	X	X		10X	X	4X		2X					4X	10X	10X	10X	10X	2X	2X	4X	10X	10X		10X	10X	10X	10X		10X					X
203		4X	X	10X	X	10X	10X	4X	2X			X	4X	10X	10X	10X	10X	2X	2X	10X							4X	4X	10X					
205							X																											
217		2X	X	10X		2X		2X					2X	4X	4X	4X	4X		X	2X			10X											
231E		10X				10X											10X																	
231W		10X				2X								10X	10X	2X	10X	X	2X	4X				X		4X								
241		X		10X	X	10X		10X		2X		X	10X										10X				4X			10X	10X	10X	10X	X
251		10X						X													4X								10X					
253		X				X											X						4X		X									
258			2X	10X	X	X		4X		X		X	10X	4X	4X	2X	2X			X	10X			2X	10X				10X					
272		10X	X	10X	X	4X	10X	10X	10X		4X	X	4X	10X	10X	10X	10X	2X	2X	4X				2X	4X									
275		2X	2X	2X	2X	X		4X			2X	4X	2X	X		X	X												X					
281		4X		4X	X	X		10X	10X		X	X	X	10X	10X	10X	10X	2X	2X	4X				2X	X				10X					

Notes:

1. Chemicals which exceed RG by 2X or greater were selected as COC for each building. "X" is the number of times a result exceeds RG.
2. Iron was not evaluated as a COC.
3. Building 205 was not further evaluated.
4. For the purpose of this evaluation, PAHs and pesticides were evaluated as a group. The individual PAH and pesticide exceeding RG are shown and the results are provided in the data tables.

COC	Chemical of potential concern
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
RG	Remediation goal
SVOC	Semivolatile organic compound
VOC	Volatile organic compound

TABLE E-4: Background Information for Buildings Evaluated at Parcel C
Evaluation of Soil Under Building Cover, Parcel C, Hunters Point Shipyard

Building Number	Area ($feet^2$)	Redevelopment Block	Reuse	Remediation Goal	FS Proposed RMP?	Non-removed Soil Exceed Under Building?	FS Excavation Proposed?	FS SVE Proposed?	Priority	Recommendation	Year Built (HRA)	Bldg. Construct. Details (thickness slab, etc.)	Potential Shallow Bedrock	Geology Data (depth to bedrock, fill, etc.)	Former Shipyard Use (1940 to 1974)[a]	Post-Navy Use[b]	Radiological Contamination Potential[c]
134	51,716	RB-11	Mixed	Residential	Yes	Yes	Adjacent to building	Yes	EPA	**Sample**	1945-49	0.3-ft concrete slab	No	Depth to bedrock greater than 10 feet bgs. Depth to bedrock south of the building is greater than 8 feet bgs.	Machine Shop, Offices, Central Tool Room	Marine Refrigeration	No
203	17,171	RB-23	R&D	Residential	Yes	No	Adjacent to building	No	EPA	**Sample**	pre 1945	RC; major add with corrugated steel walls circa 1945 (HRA)	Yes	Depth to bedrock from 2 to 4 feet bgs	Power Plant and Boiler Room	Power Plant	Impacted contamination unlikely
217	35,000	RB-18	R&D	Residential	No	Limited	Adjacent to building	No	EPA	No further evaluation	pre 1945		Yes	Depth to bedrock from 2 to 4 feet bgs	Sheet Metal Production, Photoengraving, Welding, and Paint Shop	Warehouse and Storage Area	
231E	191,497	COS-2	OS	Recreational	Yes	Limited	Adjacent to building	Yes		**Sample**	pre 1945	1.5-ft concrete slab	No	Depth to bedrock greater than 10 feet bgs.	Machine Shop	None	No
231W	191,497	RB-22	EC	Industrial	Yes	Yes	Adjacent to building	Yes	EPA	No further evaluation	pre 1945	1.5-ft concrete slab	No	Depth to bedrock greater than 10 feet bgs.	Machine Shop	None	No
241	16,246	RB-18	R&D	Residential	No	Yes	Yes	No	EPA	No further evaluation	pre 1945	wood (HRA); 1-ft concrete slab	Yes	Depth to bedrock from 2 to 4 feet bgs	Forge Shop	Metals Heat Treating Facility	No
251	56,163	RB-20B	EC	Industrial	No	Yes	Yes	No		No further evaluation	pre 1945	E side 1-ft concrete slab; W side 0.2-ft wood over 0.8-ft concrete slab	No	Depth to bedrock greater than 10 feet bgs. Shallow bedrock west of building (4 feet bgs).	Industrial Relations & Control Room	None	No
253	195,347	RB-25	EC	Industrial	No	Yes	No	Yes		No further evaluation	1945-49	6-story concrete (HRA); 1-ft concrete slab	No	Deep bedrock; ranges from 55 to 100 ft below MSL	Electronics, Optical, Radio, and Ordnance Shops	None	Impacted - Known (Restricted Access)
258	72,834	RB-20A	R&D	Residential	No	Yes	Yes	No		No further evaluation	1951-56	1-ft concrete slab	Yes	Depth to bedrock from 4 feet bgs. Depth to Bedrock north of building is 2 feet bgs.	Pipe Manufacturer and Fitters Shop	None	No
272	42,923	RB-24	R&D	Residential	Yes	Yes	Adjacent to building	Yes	EPA	No further evaluation	pre 1945	wood (HRA), 10-inch concrete slab	Yes	Depth to bedrock from 1 foot bgs.	Riggers and Laborers Shop, Shop Service Group	Machine Shop	Impacted contamination unlikely
275	8,500	RB-29	R&D	Residential	Yes	Yes	No	No	EPA	No further evaluation	1951-56	Top layer consist of 1-ft asphalt	Yes	Depth to bedrock from 1 foot bgs.	Sheet Metal Fabrication Facility	Aluminum Casting Shop	No
281	45,000	RB-24	R&D	Residential	Yes	Yes	No	Yes	EPA	No further evaluation	1968-70	2-ft concrete slab	Partial	Shallow bedrock (4 feet bgs) on west side of building.	Electronics-Weapons-Precision Facility	Occasionally leased to movie industry	No
ELIMINATED (Chemical concentrations did not exceed 2X RG)																	
205	10,284	RB-22	EC	Industrial	No	Limited	Adjacent to building	No		No further evaluation	pre 1945	brick with WWII era additions (HRA)	No	Depth to bedrock greater than 10 feet bgs.	Dry Dock 2 Pump and Compressor Plant	None	Impacted contamination unlikely

Notes

a HPS was deactivated as a Navy facility in 1974

b Tenant use identified in October 1994 (EFA WEST database of HPS Buildings). Currently, buildings in Parcel C are all unoccupied.

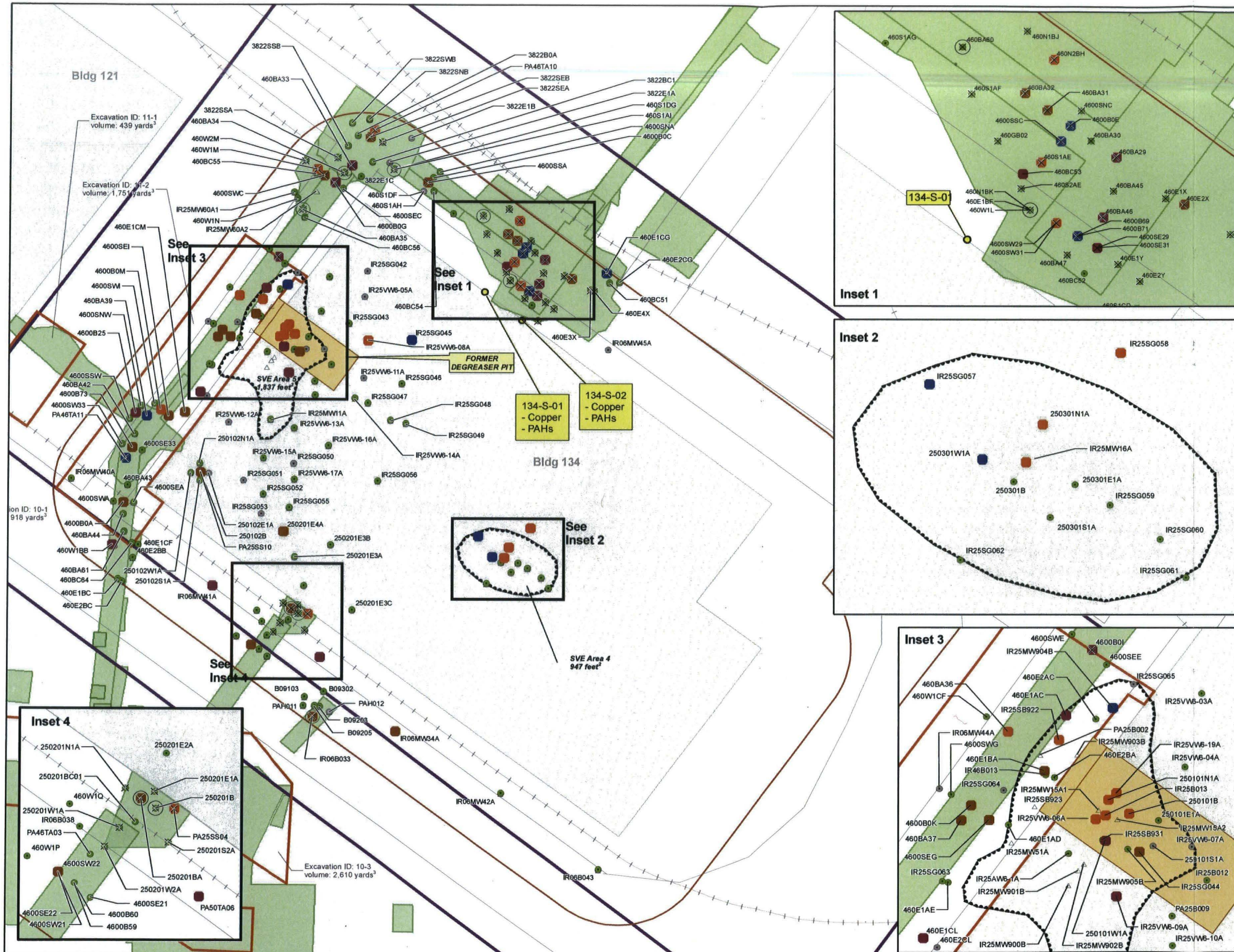
c Radiologically affected areas are defined in the Historical Radiological Assessment (Navy 2004b) as

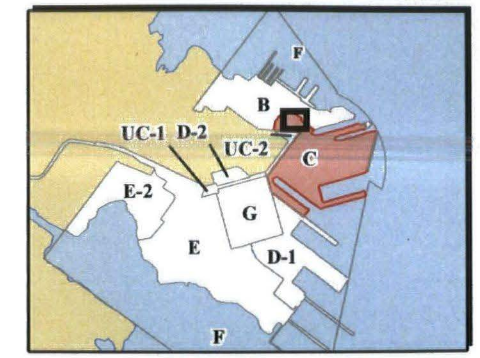
An area that has or historically had a potential for general radioactive materials contamination based on the site operating history or known contamination detected during previous radiation surveys. Impacted sites include sites where radioactive materials were used or stored, sites where known spills, discharges, or other instances involving radioactive materials have occurred, or sites where radioactive materials might have been disposed of or buried.

bgs	Below ground surface
CMI	Parcel C Maritime/Industrial
COS	Parcel C Open Space
EC	Educational/Cultural
EFA WEST	Department of the Navy, Naval Facilities Engineering Command, Engineering Field Activity West
EPA	U.S. Environmental Protection Agency
$feet^2$	Square feet
FS	Feasibility Study
HPS	Hunters Point Shipyard
HRA	Department of the Navy (2004b). "Historical Radiological Assessment Volume II, Use of General Radioactive Materials, 1939-2003, Hunters Point Shipyard, San Francisco, California." August 31.
MSL	Mean sea level
OS	Open space
RB	Redevelopment block
R&D	Research and Development
RMP	Risk Management Plan
SVE	Soil vapor extraction

References

SulTech. 2008. Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco California, Table 2-2. July 31.





- Proposed Sampling Location
- Sampling Location Where Upper Depth Soil Has Been Removed but Lower Depth Soil Remains In Place (All Depths). See Accompanying Table
- Sampling Location Where Soil Was Removed (All Depths)
- COCs Detected Above RG, Below 2X RG
- COCs Detected At or Above 2X RG, Below 4X RG
- COCs Detected At or Above 4X RG, Below 10X RG
- COCs Detected At or Above 10X RG
- COCs Detected At or Below RG
- Analyzed for COCs; Result Below Detection Limit
- Other Sample Location
- 40-foot Building Buffer
- Estimated Proposed Excavation Boundary (Alternatives S-3 and S-5)
- Estimated Proposed SVE Boundaries (Alternative S-5)
- Previously Excavated
- Possible Source Area
- Mixed Use (Residental)
- Existing Building
- Road Edge
- Rail Line

Notes:

1. Remediation goals for soil are from Table 4-1 of the Feasibility Study Report for Parcel C (SulTech 2008).
2. Only chemicals that exceeded the remediation goal in a sampling location located within the building presented, or within a 40 foot buffer of the building, by two times or greater, were selected for analysis.

COC	Chemical of Concern
Ft bgs	Feet below ground surface
RG	Remediation Goal
SVE	Soil Vapor Extraction

Source: SulTech. 2008. "Final Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California." July 31.

For BCT discussion purposes only
May 2009

0 15 30 60
Feet

ChaduxTt JV

Hunters Point Shipyard, San Francisco, California
Department of the Navy, BRAC PMO West, San Diego, CA

FIGURE A - 1, ALL COCS <= 10 FT BGS SOIL SAMPLING LOCATIONS WITHIN 40 FEET OF AND UNDER BUILDING 134

Evaluation of Soil Under Building Cover, Parcel C
Draft May 2009

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DCN: KCH-2622-0003-0015

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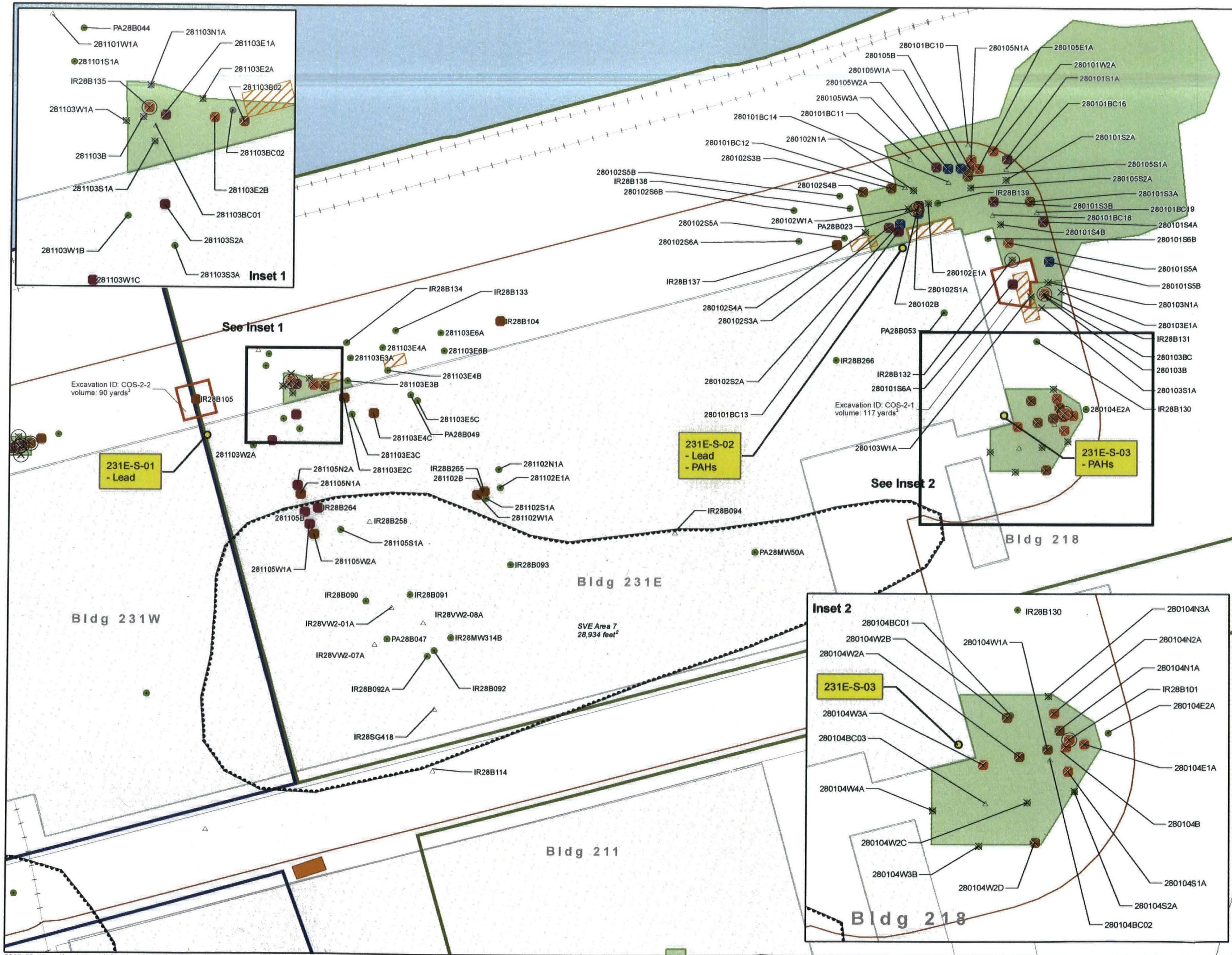

Proposed Sampling Location

Sampling Location Where Upper Depth Soil Has Been Removed but Lower Depth Soil Remains In Place (All Depths). See Accompanying Table

Sampling Location Where Soil Was Removed

COCs Detected Above RG, Below 2X RG

COCs Detected At or Above 2X RG, Below 4X RG

COCs Detected At or Above 4X RG, Below 10X RG

COCs Detected At or Above 10X RG

COCs Detected At or Below RG

Other Sample Location

40-Foot Building Buffer

Estimated Proposed Excavation Boundary (Alternatives S-3 and S-5)

Estimated Proposed SVE Boundaries (Alternative S-5)

Previously Excavated

Open Space

Educational/Cultural

Former Aboveground Storage Tank

Former Underground Storage Tank

Existing Building

Road Edge

Rail Line

Notes:

1. Remediation goals for soil are from Table 4-1 of the Feasibility Study Report for Parcel C (SulTech 2008).
2. Only chemicals that exceeded the remediation goal in a sampling location located within the building presented, or within a 40 foot buffer of the building, by two times or greater, were selected for analysis.

COC Chemical of Concern
Ft bgs Feet below ground surface
RG Remediation Goal
SVE Soil Vapor Extraction

Source: SulTech. 2008. "Final Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California." July 31.

For BCT discussion purposes only
May 2009

0 15 30 60
Feet

ChaduxTt JV
Consulting Engineers and Scientists

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FIGURE A - 4, ALL COCS<= 10 FT BGS SOIL SAMPLING LOCATIONS WITHIN 40 FEET OF AND UNDER BUILDING 231E

Evaluation of Soil Under Building Cover, Parcel C
Draft May 2009

DCN: KCH-2622-0003-0015

Table S1. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 134 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
PAH	2-METHYLNAPHTHALENE	2.3	0.01	14	150	0	0	0	0
PAH	BENZO(A)ANTHRACENE	5.4	0.009	51	0.37	10	6	1	1
PAH	BENZO(A)PYRENE	4.8	0.01	45	0.33	10	8	2	1
PAH	BENZO(B)FLUORANTHENE	6.9	0.008	53	0.34	10	10	6	1
PAH	BENZO(K)FLUORANTHENE	4.4	0.01	33	0.34	8	6	3	1
PAH	CHRYSENE	6.8	0.01	54	3.3	1	1	0	0
PAH	DIBENZ(A,H)ANTHRACENE	1	0.008	17	0.33	2	1	0	0
PAH	INDENO(1,2,3-CD)PYRENE	2	0.008	29	0.35	6	4	1	0
PAH	NAPHTHALENE	0.46	0.011	9	1.7	0	0	0	0
PCB	AROCLOR-1260	3.2	0.008	78	0.21	19	12	6	5
PEST	AROCLOR-1260	7	0.013	11	0.21	5	4	4	3
SVOA	1,4-DICHLOROBENZENE	0.16	0.16	1	2	0	0	0	0
SVOA	2-METHYLNAPHTHALENE	56	0.037	9	150	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	0.42	0.018	8	0.37	1	0	0	0
SVOA	BENZO(A)PYRENE	0.32	0.12	4	0.33	0	0	0	0
SVOA	BENZO(B)FLUORANTHENE	0.32	0.041	6	0.34	0	0	0	0
SVOA	BENZO(K)FLUORANTHENE	0.34	0.092	5	0.34	0	0	0	0
SVOA	BIS(2-ETHYLHEXYL)PHTHALATE	1.2	1.2	1	1.1	1	0	0	0
SVOA	CHRYSENE	0.58	0.027	14	3.3	0	0	0	0
SVOA	INDENO(1,2,3-CD)PYRENE	0.11	0.11	1	0.35	0	0	0	0
SVOA	NAPHTHALENE	19	0.21	3	1.7	1	1	1	1
TMETAL	ANTIMONY	12	1.5	11	10	1	0	0	0
TMETAL	ARSENIC	16.1	0.81	64	11.1	1	0	0	0
TMETAL	CADMIUM	3.3	0.38	6	3.5	0	0	0	0
TMETAL	COPPER	2080	4.5	188	160	18	11	6	3
TMETAL	IRON	68900	4640	37	58000	2	0	0	0
TMETAL	LEAD	1230	1.6	60	155	3	1	1	0
TMETAL	MANGANESE	4480	43.1	149	1431	14	5	0	0
TMETAL	MERCURY	0.6	0.081	27	2.28	0	0	0	0
TMETAL	NICKEL	2130	16.3	37	2650	0	0	0	0
TMETAL	THALLIUM	0.53	0.53	1	5	0	0	0	0
TMETAL	VANADIUM	100	4.4	37	117	0	0	0	0
TMETAL	ZINC	2560	21.2	139	370	10	5	2	0
VOA	1,2-DICHLOROETHANE	0.027	0.027	1	0.28	0	0	0	0
VOA	1,4-DICHLOROBENZENE	94	1.6	3	2	2	2	1	1
VOA	BENZENE	0.0027	0.002	2	0.18	0	0	0	0
VOA	TETRACHLOROETHENE	57	0.003	5	0.48	1	1	1	1
VOA	TRICHLOROETHENE	120	0.003	14	2.9	3	3	3	2
VOA	VINYL CHLORIDE	1.5	0.002	8	0.024	2	2	1	1
VOA8260	1,2-DICHLOROETHANE	12	0.00349	7	0.28	3	3	3	3
VOA8260	1,4-DICHLOROBENZENE	48	0.00309	17	2	5	3	2	2

Table S1. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 134 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
VOA8260	BENZENE	0.157	0.00433	8	0.18	0	0	0	0
VOA8260	NAPHTHALENE	12.7	0.00298	18	1.7	3	2	1	0
VOA8260	TETRACHLOROETHENE	139	0.0016	19	0.48	4	4	4	3
VOA8260	TRICHLOROETHENE	64.2	0.00204	26	2.9	4	3	3	1
VOA8260	VINYL CHLORIDE	0.407	0.00648	10	0.024	8	4	3	1

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
PAH	polycyclic aromatic hydrocarbons
PCB	polycholorinated biphenyls
PEST	pesticides
SVOA	semi-volatile organic analysis
TMETAL	total metals
VOA	volatile organic analysis
VOA8260	volatile organic analysis by EPA Method 8260

Table S2. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 203 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
ORGPB	ORGANIC LEAD	21	0.31	16	0.5	15	4	3	1
PAH	2-METHYLNAPHTHALENE	0.34	0.008	27	150	0	0	0	0
PAH	BENZO(A)ANTHRACENE	12	0.009	69	0.37	15	10	5	2
PAH	BENZO(A)PYRENE	8.9	0.009	65	0.33	18	10	6	2
PAH	BENZO(B)FLUORANTHENE	8.8	0.008	74	0.34	17	9	6	3
PAH	BENZO(K)FLUORANTHENE	5.1	0.008	39	0.34	11	5	2	1
PAH	CHRYSENE	11	0.009	75	3.3	3	2	0	0
PAH	DIBENZ(A,H)ANTHRACENE	0.95	0.011	23	0.33	4	3	0	0
PAH	INDENO(1,2,3-CD)PYRENE	3.7	0.009	42	0.35	10	4	3	1
PAH	NAPHTHALENE	6.5	0.008	30	1.7	1	1	0	0
PCB	AROCLOR-1254	0.87	0.024	10	0.093	5	5	3	0
PCB	AROCLOR-1260	2100	0.014	82	0.21	37	31	20	12
PEST	AROCLOR-1254	1.4	1.4	1	0.093	1	1	1	1
PEST	AROCLOR-1260	39	0.015	11	0.21	7	4	4	2
PEST	DIELDRIN	0.002	0.002	1	0.003	0	0	0	0
SVOA	1,4-DICHLOROBENZENE	0.1	0.1	1	2	0	0	0	0
SVOA	2-METHYLNAPHTHALENE	0.38	0.18	2	150	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	7.7	0.025	11	0.37	3	1	1	1
SVOA	BENZO(A)PYRENE	4.7	0.022	9	0.33	3	1	1	1
SVOA	BENZO(B)FLUORANTHENE	6.7	0.033	8	0.34	2	2	1	1
SVOA	BENZO(K)FLUORANTHENE	2.7	0.05	4	0.34	2	1	1	0
SVOA	CHRYSENE	13	0.018	14	3.3	2	2	0	0
SVOA	DIBENZ(A,H)ANTHRACENE	0.94	0.096	2	0.33	1	1	0	0
SVOA	INDENO(1,2,3-CD)PYRENE	0.2	0.043	2	0.35	0	0	0	0
SVOA	NAPHTHALENE	0.15	0.037	2	1.7	0	0	0	0
SVOA	N-NITROSO-DI-N-PROPYLAMINE	0.11	0.11	1	0.33	0	0	0	0
TMETAL	ANTIMONY	6.5	0.64	8	10	0	0	0	0
TMETAL	ARSENIC	46	0.41	106	11.1	11	3	1	0
TMETAL	CADMIUM	4.1	0.05	96	3.5	2	0	0	0
TMETAL	COPPER	7600	5.7	256	160	39	23	11	3
TMETAL	IRON	70700	12700	28	58000	1	0	0	0
TMETAL	LEAD	1730	0.31	161	155	22	7	2	1
TMETAL	MANGANESE	14200	40	257	1431	49	12	6	0
TMETAL	MERCURY	8.7	0.032	52	2.28	4	2	0	0
TMETAL	NICKEL	498	39.4	29	2650	0	0	0	0
TMETAL	THALLIUM	3.7	0.32	27	5	0	0	0	0

Table S2. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 203 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
TMETAL	VANADIUM	226	17.8	28	117	3	0	0	0
TMETAL	ZINC	2200	17	155	370	13	5	1	0
VOA	NAPHTHALENE	14	0.011	2	1.7	1	1	1	0
VOA	TETRACHLOROETHENE	0.002	0.001	3	0.48	0	0	0	0
VOA	TRICHLOROETHENE	0.001	0.001	1	2.9	0	0	0	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
ORGPB	organic lead
PAH	polycyclic aromatic hydrocarbons
PEST	pesticides
SVOA	semi-volatile organic analysis
TMETAL	total metals
VOA	volatile organic analysis

Table S3. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 205 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
ORGPB	ORGANIC LEAD	0.93	0.93	1	0.5	1	0	0	0
PAH	BENZO(A)ANTHRACENE	0.16	0.11	2	1.8	0	0	0	0
PAH	BENZO(A)PYRENE	0.2	0.1	2	0.33	0	0	0	0
PAH	BENZO(B)FLUORANTHENE	0.33	0.094	2	1.8	0	0	0	0
PAH	BENZO(K)FLUORANTHENE	0.31	0.12	2	1.8	0	0	0	0
PAH	CHRYSENE	0.37	0.21	2	18	0	0	0	0
PAH	DIBENZ(A,H)ANTHRACENE	0.084	0.02	2	0.33	0	0	0	0
PAH	INDENO(1,2,3-CD)PYRENE	0.23	0.048	2	1.8	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	0.12	0.089	2	1.8	0	0	0	0
SVOA	BENZO(A)PYRENE	0.14	0.088	2	0.33	0	0	0	0
SVOA	BENZO(B)FLUORANTHENE	0.21	0.13	2	1.8	0	0	0	0
SVOA	BENZO(K)FLUORANTHENE	0.078	0.078	1	1.8	0	0	0	0
SVOA	CHRYSENE	0.15	0.097	2	18	0	0	0	0
SVOA	INDENO(1,2,3-CD)PYRENE	0.075	0.075	1	1.8	0	0	0	0
TMETAL	ARSENIC	6.9	1.6	2	11.1	0	0	0	0
TMETAL	LEAD	122	22.1	3	800	0	0	0	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
ORGPB	organic lead
PAH	polycyclic aromatic hydrocarbons
SVOA	semi-volatile organic analysis
TMETAL	total metals

Table S4. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 217 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
PAH	2-METHYLNAPHTHALENE	0.34	0.012	12	150	0	0	0	0
PAH	BENZO(A)ANTHRACENE	2.9	0.016	6	0.37	1	1	1	0
PAH	BENZO(A)PYRENE	2.6	0.009	4	0.33	1	1	1	0
PAH	BENZO(B)FLUORANTHENE	2	0.016	13	0.34	1	1	1	0
PAH	BENZO(K)FLUORANTHENE	2.7	0.038	3	0.34	1	1	1	0
PAH	CHRYSENE	3.1	0.017	12	3.3	0	0	0	0
PAH	DIBENZ(A,H)ANTHRACENE	0.52	0.52	1	0.33	1	0	0	0
PAH	INDENO(1,2,3-CD)PYRENE	1.3	0.008	4	0.35	1	1	0	0
PAH	NAPHTHALENE	0.24	0.015	11	1.7	0	0	0	0
SVOA	2-METHYLNAPHTHALENE	0.21	0.044	7	150	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	0.034	0.034	1	0.37	0	0	0	0
SVOA	BENZO(A)PYRENE	0.048	0.027	2	0.33	0	0	0	0
SVOA	BENZO(B)FLUORANTHENE	0.04	0.024	3	0.34	0	0	0	0
SVOA	BENZO(K)FLUORANTHENE	0.027	0.025	2	0.34	0	0	0	0
SVOA	BIS(2-ETHYLHEXYL)PHTHALATE	0.08	0.08	1	1.1	0	0	0	0
SVOA	CHRYSENE	0.055	0.04	2	3.3	0	0	0	0
SVOA	NAPHTHALENE	0.29	0.028	5	1.7	0	0	0	0
TMETAL	ANTIMONY	3.9	3.7	2	10	0	0	0	0
TMETAL	ARSENIC	24.4	3.3	22	11.1	3	1	0	0
TMETAL	CADMIUM	5.8	0.73	15	3.5	6	0	0	0
TMETAL	COPPER	4800	4.8	33	180	2	2	2	1
TMETAL	IRON	50500	26000	16	58000	0	0	0	0
TMETAL	LEAD	550	0.42	27	155	2	1	0	0
TMETAL	MANGANESE	3660	288	28	1431	6	2	0	0
TMETAL	MERCURY	0.68	0.06	16	2.28	0	0	0	0
TMETAL	NICKEL	761	8.1	33	2650	0	0	0	0
TMETAL	THALLIUM	0.72	0.72	1	5	0	0	0	0
TMETAL	VANADIUM	109	19.3	16	117	0	0	0	0
TMETAL	ZINC	1320	22	35	370	2	2	0	0
VOA	BENZENE	3.9	0.001	20	0.18	3	2	2	2
VOA	TETRACHLOROETHENE	0.0019	0.0019	1	0.48	0	0	0	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
PAH	polycyclic aromatic hydrocarbons
SVOA	semi-volatile organic analysis
TMETAL	total metals
VOA	volatile organic analysis

Table S5. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 231(East) and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
PAH	BENZO(A)PYRENE	10	0.008	106	0.33	30	20	8	4
SVOA	BENZO(A)PYRENE	9.8	0.057	21	0.33	7	5	3	3
TMETAL	ARSENIC	707	0.42	128	11.1	40	23	12	8
TMETAL	LEAD	2510	1.2	80	155	15	7	5	3

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
PAH	polycyclic aromatic hydrocarbons
SVOA	semi-volatile organic analysis
TMETAL	total metals

Table S6. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 231 (West) and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
PAH	BENZO(A)ANTHRACENE	22	0.014	106	1.8	9	5	5	2
PAH	BENZO(A)PYRENE	21	0.012	101	0.33	32	20	12	7
PAH	BENZO(B)FLUORANTHENE	23	0.012	107	1.8	9	7	4	2
PAH	BENZO(K)FLUORANTHENE	6.5	0.012	71	1.8	3	1	0	0
PAH	CHRYSENE	21	0.009	116	18	1	0	0	0
PAH	DIBENZ(A,H)ANTHRACENE	1.2	0.011	35	0.33	6	4	0	0
PAH	INDENO(1,2,3-CD)PYRENE	9.6	0.011	80	1.8	6	3	2	0
PCB	AROCLOR-1260	0.038	0.026	2	1	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	0.21	0.042	9	1.8	0	0	0	0
SVOA	BENZO(A)PYRENE	0.21	0.067	6	0.33	0	0	0	0
SVOA	BENZO(B)FLUORANTHENE	0.2	0.064	7	1.8	0	0	0	0
SVOA	BENZO(K)FLUORANTHENE	0.18	0.061	6	1.8	0	0	0	0
SVOA	CHRYSENE	0.27	0.058	9	18	0	0	0	0
SVOA	INDENO(1,2,3-CD)PYRENE	0.29	0.04	4	1.8	0	0	0	0
TMETAL	ARSENIC	200	0.31	133	11.1	43	27	16	1
TMETAL	LEAD	2610	0.65	169	800	10	2	0	0
VOA	BENZENE	0.0053	0.0014	5	0.39	0	0	0	0
VOA	TETRACHLOROETHENE	1.6	0.001	19	1.5	1	0	0	0
VOA	TRICHLOROETHENE	0.042	0.003	10	6.6	0	0	0	0
VOA	VINYL CHLORIDE	0.25	0.003	2	0.055	1	1	1	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
SVOA	semi-volatile organic analysis
TMETAL	total metals
VOA	volatile organic analysis

Table S7. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 241 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
PAH	2-METHYLNAPHTHALENE	0.45	0.009	64	150	0	0	0	0
PAH	BENZO(A)ANTHRACENE	0.064	0.015	26	0.37	0	0	0	0
PAH	BENZO(A)PYRENE	0.038	0.011	7	0.33	0	0	0	0
PAH	BENZO(B)FLUORANTHENE	0.071	0.008	75	0.34	0	0	0	0
PAH	CHRYSENE	0.072	0.009	68	3.3	0	0	0	0
PAH	INDENO(1,2,3-CD)PYRENE	0.013	0.009	5	0.35	0	0	0	0
PAH	NAPHTHALENE	0.5	0.009	65	1.7	0	0	0	0
PCB	AROCLOR-1260	0.2	0.019	11	0.21	0	0	0	0
PEST	AROCLOR-1260	0.2	0.041	2	0.21	0	0	0	0
PEST	DIELDRIN	0.066	0.012	2	0.003	2	2	2	1
PEST	GAMMA-BHC (LINDANE)	0.028	0.0089	3	0.0026	3	3	2	1
PEST	HEPTACHLOR EPOXIDE	0.23	0.006	2	0.0017	2	2	1	1
PEST	HEPTACHLOR EPOXIDE B	0.32	0.0035	3	0.0017	3	3	2	2
SVOA	2-METHYLNAPHTHALENE	0.5	0.012	20	150	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	0.15	0.15	1	0.37	0	0	0	0
SVOA	BENZO(A)PYRENE	0.028	0.019	3	0.33	0	0	0	0
SVOA	BENZO(B)FLUORANTHENE	0.13	0.018	4	0.34	0	0	0	0
SVOA	BENZO(K)FLUORANTHENE	0.11	0.017	2	0.34	0	0	0	0
SVOA	BIS(2-ETHYLHEXYL)PHTHALATE	1.5	0.46	2	1.1	1	0	0	0
SVOA	CHRYSENE	0.19	0.016	7	3.3	0	0	0	0
SVOA	NAPHTHALENE	0.52	0.016	17	1.7	0	0	0	0
TMETAL	ANTIMONY	6.6	0.78	13	10	0	0	0	0
TMETAL	ARSENIC	15.8	0.56	47	11.1	4	0	0	0
TMETAL	CADMIUM	3.3	0.17	22	3.5	0	0	0	0
TMETAL	COPPER	24000	3.2	190	160	31	20	14	10
TMETAL	IRON	82000	13200	45	58000	4	0	0	0
TMETAL	LEAD	2000	0.66	149	155	7	4	2	1
TMETAL	MANGANESE	31000	250	76	1431	5	2	1	1
TMETAL	MERCURY	0.93	0.05	35	2.28	0	0	0	0
TMETAL	NICKEL	8650	8.4	170	2650	7	3	0	0
TMETAL	THALLIUM	1.5	1.5	1	5	0	0	0	0
TMETAL	VANADIUM	121	14.1	45	117	2	0	0	0
TMETAL	ZINC	5350	15	180	370	15	10	3	1
VOA	1,2-DICHLOROETHANE	0.003	0.002	3	0.28	0	0	0	0
VOA	1,4-DICHLOROBENZENE	0.4	0.4	1	2	0	0	0	0
VOA	BENZENE	11	0.0006	184	0.18	63	57	52	48

Table S7. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 241 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
VOA	NAPHTHALENE	12	0.0075	3	1.7	1	1	1	0
VOA	TETRACHLOROETHENE	0.21	0.001	5	0.48	0	0	0	0
VOA	TRICHLOROETHENE	1.1	0.00048	3	2.9	0	0	0	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
PAH	polycyclic aromatic hydrocarbons
PCB	polycholorinated biphenyls
PEST	pesticides
SVOA	semi-volatile organic analysis
TMETAL	total metals

Table S8. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 251 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
PAH	BENZO(A)ANTHRACENE	0.066	0.051	2	1.8	0	0	0	0
PAH	BENZO(A)PYRENE	0.096	0.062	2	0.33	0	0	0	0
PAH	BENZO(B)FLUORANTHENE	0.12	0.12	1	1.8	0	0	0	0
PAH	CHRYSENE	0.071	0.059	2	18	0	0	0	0
PAH	DIBENZ(A,H)ANTHRACENE	0.042	0.042	1	0.33	0	0	0	0
PAH	INDENO(1,2,3-CD)PYRENE	0.089	0.089	1	1.8	0	0	0	0
PCB	AROCLOR-1260	230	0.026	22	1	11	10	8	7
PEST	AROCLOR-1260	270	0.048	7	1	2	2	2	2
SVOA	BENZO(A)ANTHRACENE	0.27	0.063	3	1.8	0	0	0	0
SVOA	BENZO(A)PYRENE	0.25	0.028	5	0.33	0	0	0	0
SVOA	BENZO(B)FLUORANTHENE	0.36	0.04	6	1.8	0	0	0	0
SVOA	BENZO(K)FLUORANTHENE	0.14	0.14	2	1.8	0	0	0	0
SVOA	CHRYSENE	0.26	0.083	3	18	0	0	0	0
TMETAL	ARSENIC	245	0.93	54	11.1	7	3	2	1
TMETAL	COPPER	14	14	1	160	0	0	0	0
TMETAL	LEAD	580	2.7	34	800	0	0	0	0
TMETAL	MANGANESE	1500	220	9	1431	1	0	0	0
VOA	BENZENE	0.11	0.0047	2	0.39	0	0	0	0
VOA	TRICHLOROETHENE	0.003	0.003	1	6.6	0	0	0	0
VOA8260	1,4-DICHLOROBENZENE	34.2	0.0062	14	4.5	5	5	2	0
VOA8260	BENZENE	0.0187	0.00335	7	0.39	0	0	0	0
VOA8260	TETRACHLOROETHENE	0.0675	0.0015	11	1.5	0	0	0	0
VOA8260	TRICHLOROETHENE	0.013	0.00108	4	6.6	0	0	0	0
VOA8260	VINYL CHLORIDE	0.00231	0.00202	2	0.055	0	0	0	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
PAH	polycyclic aromatic hydrocarbons
PCB	polycholorinated biphenyls
PEST	pesticides
SVOA	semi-volatile organic analysis
TMETAL	total metals
VOA	volatile organic analysis
VOA8260	volatile organic analysis by EPA Method 8260

Table S9. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 253 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
PAH	BENZO(A)ANTHRACENE	0.31	0.022	15	1.8	0	0	0	0
PAH	BENZO(A)PYRENE	0.35	0.021	12	0.33	1	0	0	0
PAH	BENZO(B)FLUORANTHENE	0.35	0.016	16	1.8	0	0	0	0
PAH	BENZO(K)FLUORANTHENE	0.14	0.034	8	1.8	0	0	0	0
PAH	CHRYSENE	0.39	0.02	15	18	0	0	0	0
PAH	DIBENZ(A,H)ANTHRACENE	0.049	0.049	1	0.33	0	0	0	0
PAH	INDENO(1,2,3-CD)PYRENE	0.24	0.033	7	1.8	0	0	0	0
PEST	AROCLOR-1260	0.25	0.03	3	1	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	0.38	0.051	2	1.8	0	0	0	0
SVOA	BENZO(A)PYRENE	0.36	0.029	3	0.33	1	0	0	0
SVOA	BENZO(B)FLUORANTHENE	0.35	0.039	3	1.8	0	0	0	0
SVOA	BENZO(K)FLUORANTHENE	0.33	0.33	1	1.8	0	0	0	0
SVOA	CHRYSENE	0.62	0.023	6	18	0	0	0	0
SVOA	DIBENZ(A,H)ANTHRACENE	0.033	0.033	1	0.33	0	0	0	0
SVOA	INDENO(1,2,3-CD)PYRENE	0.13	0.025	2	1.8	0	0	0	0
TMETAL	ARSENIC	13	0.437	31	11.1	1	0	0	0
TMETAL	LEAD	939	0.282	46	800	1	0	0	0
VOA	BENZENE	1.9	0.0014	3	0.39	1	1	1	0
VOA	TETRACHLOROETHENE	0.022	0.001	5	1.5	0	0	0	0
VOA	TRICHLOROETHENE	0.22	0.003	12	6.6	0	0	0	0
VOA8260	1,4-DICHLOROBENZENE	0.252	0.0247	5	4.5	0	0	0	0
VOA8260	BENZENE	0.00497	0.00497	1	0.39	0	0	0	0
VOA8260	TETRACHLOROETHENE	0.242	0.0015	6	1.5	0	0	0	0
VOA8260	TRICHLOROETHENE	8.41	0.00291	19	6.6	1	0	0	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
PAH	polycyclic aromatic hydrocarbons
PEST	pesticides
SVOA	semi-volatile organic analysis
TMETAL	total metals
VOA	volatile organic analysis
VOA8260	volatile organic analysis by EPA Method 8260

Table S10. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 258 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
PAH	2-METHYLNAPHTHALENE	0.45	0.011	9	150	0	0	0	0
PAH	BENZO(A)ANTHRACENE	1.8	0.019	24	0.37	3	1	1	0
PAH	BENZO(A)PYRENE	1.2	0.021	24	0.33	3	1	0	0
PAH	BENZO(B)FLUORANTHENE	2	0.03	26	0.34	5	2	1	0
PAH	BENZO(K)FLUORANTHENE	0.7	0.023	21	0.34	4	1	0	0
PAH	CHRYSENE	2	0.014	29	3.3	0	0	0	0
PAH	DIBENZ(A,H)ANTHRACENE	0.048	0.012	6	0.33	0	0	0	0
PAH	INDENO(1,2,3-CD)PYRENE	0.63	0.03	17	0.35	2	0	0	0
PAH	NAPHTHALENE	0.38	0.012	12	1.7	0	0	0	0
PCB	AROCLOR-1260	2.4	0.017	6	0.21	3	3	1	1
PEST	AROCLOR-1260	0.6	0.086	3	0.21	1	1	0	0
SVOA	1,4-DICHLOROBENZENE	1.1	0.85	2	2	0	0	0	0
SVOA	2-METHYLNAPHTHALENE	0.37	0.37	1	150	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	0.51	0.51	1	0.37	1	0	0	0
SVOA	BENZO(A)PYRENE	0.31	0.31	1	0.33	0	0	0	0
SVOA	BENZO(B)FLUORANTHENE	0.36	0.36	1	0.34	1	0	0	0
SVOA	BENZO(K)FLUORANTHENE	0.24	0.24	1	0.34	0	0	0	0
SVOA	BIS(2-ETHYLHEXYL)PHTHALATE	0.27	0.13	7	1.1	0	0	0	0
SVOA	CHRYSENE	0.93	0.53	2	3.3	0	0	0	0
SVOA	HEXACHLOROBENZENE	0.082	0.082	1	0.33	0	0	0	0
TMETAL	ANTIMONY	7.9	3.3	3	10	0	0	0	0
TMETAL	ARSENIC	11.1	0.56	26	11.1	0	0	0	0
TMETAL	CADMIUM	10.6	0.31	22	3.5	3	1	0	0
TMETAL	COPPER	2700	2.7	120	160	10	7	6	1
TMETAL	IRON	63800	121	23	58000	4	0	0	0
TMETAL	LEAD	191	0.67	22	155	2	0	0	0
TMETAL	LEAD	18	4	6	800	0	0	0	0
TMETAL	MANGANESE	8990	2.1	144	1431	22	8	4	0
TMETAL	MERCURY	1.8	0.06	15	2.28	0	0	0	0
TMETAL	NICKEL	2700	14.1	24	2650	1	0	0	0
TMETAL	THALLIUM	1.8	0.65	4	5	0	0	0	0
TMETAL	VANADIUM	152	0.63	24	117	2	0	0	0
TMETAL	ZINC	36000	13	124	370	28	20	5	3
VOA	1,4-DICHLOROBENZENE	80	0.79	4	2	3	3	3	1
VOA	BENZENE	0.002	0.002	1	0.18	0	0	0	0
VOA	TETRACHLOROETHENE	1.5	0.0008	32	0.48	3	3	0	0

Table S10. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 258 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
VOA	TRICHLOROETHENE	36	0.002	89	2.9	12	10	9	2
VOA	TRICHLOROETHENE	0.003	0.003	1	6.6	0	0	0	0
VOA	VINYL CHLORIDE	0.002	0.002	1	0.024	0	0	0	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PEST	pesticides
SVOA	semi-volatile organic analysis
TMETAL	total metals
VOA	volatile organic analysis

Table S11. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 272 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
ORGPB	ORGANIC LEAD	62	0.63	4	0.5	4	3	2	1
PAH	2-METHYLNAPHTHALENE	2	0.009	34	150	0	0	0	0
PAH	BENZO(A)ANTHRACENE	11	0.008	84	0.37	20	10	4	1
PAH	BENZO(A)PYRENE	8.4	0.008	79	0.33	19	9	5	2
PAH	BENZO(B)FLUORANTHENE	11	0.011	84	0.34	15	7	5	1
PAH	BENZO(K)FLUORANTHENE	2.8	0.01	57	0.34	8	2	2	0
PAH	CHRYSENE	11	0.012	97	3.3	2	1	0	0
PAH	DIBENZ(A,H)ANTHRACENE	1	0.009	37	0.33	3	1	0	0
PAH	INDENO(1,2,3-CD)PYRENE	3.4	0.008	62	0.35	6	4	2	0
PAH	NAPHTHALENE	1.3	0.0087	38	1.7	0	0	0	0
PCB	AROCLOR-1260	0.11	0.0088	10	0.21	0	0	0	0
PEST	AROCLOR-1254	0.049	0.049	1	0.093	0	0	0	0
PEST	AROCLOR-1260	0.08	0.047	3	0.21	0	0	0	0
SVOA	2-METHYLNAPHTHALENE	0.042	0.042	1	150	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	1.7	0.033	7	0.37	2	2	1	0
SVOA	BENZO(A)PYRENE	1.2	0.03	7	0.33	3	1	0	0
SVOA	BENZO(B)FLUORANTHENE	1.3	0.038	7	0.34	3	1	0	0
SVOA	BENZO(K)FLUORANTHENE	0.92	0.04	6	0.34	1	1	0	0
SVOA	CHRYSENE	2.1	0.023	8	3.3	0	0	0	0
SVOA	DIBENZ(A,H)ANTHRACENE	0.09	0.09	1	0.33	0	0	0	0
SVOA	INDENO(1,2,3-CD)PYRENE	0.32	0.056	3	0.35	0	0	0	0
SVOA	NAPHTHALENE	0.033	0.033	1	1.7	0	0	0	0
TMETAL	ANTIMONY	5	0.8	17	10	0	0	0	0
TMETAL	ARSENIC	116	0.178	414	11.1	128	56	14	1
TMETAL	CADMIUM	6.6	0.08	56	3.5	18	0	0	0
TMETAL	COPPER	3300	4.2	527	160	132	51	10	1
TMETAL	IRON	73100	20800	28	58000	5	0	0	0
TMETAL	LEAD	780	0.347	124	155	4	1	1	0
TMETAL	MANGANESE	55300	33.3	558	1431	415	304	149	30
TMETAL	MERCURY	124	0.025	141	2.28	9	7	4	3
TMETAL	NICKEL	975	43.3	28	2650	0	0	0	0
TMETAL	THALLIUM	35	0.46	62	5	26	13	6	0
TMETAL	VANADIUM	175	17.8	28	117	10	0	0	0
TMETAL	ZINC	2500	8.8	180	370	18	7	1	0
VOA	1,2-DICHLOROETHANE	0.022	0.002	3	0.28	0	0	0	0
VOA	1,4-DICHLOROBENZENE	0.021	0.009	2	2	0	0	0	0

Table S11. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 272 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
VOA	BENZENE	0.003	0.003	1	0.18	0	0	0	0
VOA	NAPHTHALENE	0.32	0.32	1	1.7	0	0	0	0
VOA	TETRACHLOROETHENE	1.7	0.002	9	0.48	2	2	0	0
VOA	TRICHLOROETHENE	6.4	0.001	33	2.9	3	1	0	0
VOA8260	1,2-DICHLOROETHANE	0.016	0.00781	2	0.28	0	0	0	0
VOA8260	NAPHTHALENE	0.69	0.00425	2	1.7	0	0	0	0
VOA8260	TETRACHLOROETHENE	0.525	0.00273	2	0.48	1	0	0	0
VOA8260	TRICHLOROETHENE	17.8	0.00107	35	2.9	2	1	1	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
ORGPB	organic lead
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PEST	pesticides
SVOA	semi-volatile organic analysis
TMETAL	total metals
VOA	volatile organic analysis
VOA8260	volatile organic analysis by EPA Method 8260

Table S12. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 275 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
PAH	2-METHYLNAPHTHALENE	0.033	0.014	4	150	0	0	0	0
PAH	BENZO(A)ANTHRACENE	0.026	0.014	4	0.37	0	0	0	0
PAH	BENZO(A)PYRENE	0.028	0.014	2	0.33	0	0	0	0
PAH	BENZO(B)FLUORANTHENE	0.055	0.009	4	0.34	0	0	0	0
PAH	CHRYSENE	0.043	0.013	6	3.3	0	0	0	0
PAH	INDENO(1,2,3-CD)PYRENE	0.011	0.011	1	0.35	0	0	0	0
PAH	NAPHTHALENE	0.02	0.016	3	1.7	0	0	0	0
PCB	AROCLOR-1260	0.21	0.036	3	0.21	0	0	0	0
PEST	AROCLOR-1260	0.28	0.28	1	0.21	1	0	0	0
PEST	HEPTACHLOR EPOXIDE	0.0009	0.0009	1	0.0017	0	0	0	0
SVOA	2-METHYLNAPHTHALENE	1.1	1.1	1	150	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	0.53	0.53	1	0.37	1	0	0	0
SVOA	BENZO(A)PYRENE	0.4	0.31	2	0.33	1	0	0	0
SVOA	BENZO(B)FLUORANTHENE	0.33	0.33	1	0.34	0	0	0	0
SVOA	BENZO(K)FLUORANTHENE	0.36	0.36	1	0.34	1	0	0	0
SVOA	CHRYSENE	1	0.024	3	3.3	0	0	0	0
TMETAL	ANTIMONY	1.4	1.4	1	10	0	0	0	0
TMETAL	ARSENIC	23.9	0.255	41	11.1	6	2	0	0
TMETAL	CADMIUM	11	0.26	26	3.5	3	2	0	0
TMETAL	COPPER	417	14	85	160	8	3	0	0
TMETAL	IRON	125000	11700	15	58000	1	1	0	0
TMETAL	LEAD	215	1	12	155	1	0	0	0
TMETAL	MANGANESE	14200	304	72	1431	33	22	7	0
TMETAL	MERCURY	1.6	0.05	9	2.28	0	0	0	0
TMETAL	NICKEL	384	28.8	15	2650	0	0	0	0
TMETAL	THALLIUM	15	1	3	2.5	1	1	0	0
TMETAL	VANADIUM	636	11.9	51	117	5	1	1	0
TMETAL	ZINC	827	34.2	50	370	1	1	0	0
VOA	TRICHLOROETHENE	0.003	0.003	1	2.9	0	0	0	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PEST	pesticides
SVOA	semi-volatile organic analysis
TMETAL	total metals
VOA	volatile organic analysis

Table S13. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 281 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
PAH	2-METHYLNAPHTHALENE	2	0.009	26	150	0	0	0	0
PAH	BENZO(A)ANTHRACENE	11	0.012	66	0.37	19	10	4	1
PAH	BENZO(A)PYRENE	8.4	0.011	67	0.33	19	9	5	2
PAH	BENZO(B)FLUORANTHENE	11	0.011	64	0.34	15	7	5	1
PAH	BENZO(K)FLUORANTHENE	2.8	0.009	48	0.34	7	2	2	0
PAH	CHRYSENE	11	0.016	74	3.3	2	1	0	0
PAH	DIBENZ(A,H)ANTHRACENE	1	0.012	26	0.33	3	1	0	0
PAH	INDENO(1,2,3-CD)PYRENE	3.4	0.009	51	0.35	6	4	2	0
PAH	NAPHTHALENE	1.3	0.01	30	1.7	0	0	0	0
PCB	AROCLOR-1260	0.088	0.027	2	0.21	0	0	0	0
PEST	AROCLOR-1254	0.049	0.049	1	0.093	0	0	0	0
PEST	AROCLOR-1260	140	0.047	6	0.21	2	2	2	1
SVOA	2-METHYLNAPHTHALENE	0.042	0.042	1	150	0	0	0	0
SVOA	BENZO(A)ANTHRACENE	1.7	0.029	5	0.37	2	2	1	0
SVOA	BENZO(A)PYRENE	1.2	0.031	6	0.33	3	1	0	0
SVOA	BENZO(B)FLUORANTHENE	1.3	0.048	4	0.34	3	1	0	0
SVOA	BENZO(K)FLUORANTHENE	0.92	0.042	3	0.34	1	1	0	0
SVOA	CHRYSENE	2.1	0.023	7	3.3	0	0	0	0
SVOA	DIBENZ(A,H)ANTHRACENE	0.09	0.09	1	0.33	0	0	0	0
SVOA	INDENO(1,2,3-CD)PYRENE	0.32	0.26	2	0.35	0	0	0	0
SVOA	NAPHTHALENE	0.033	0.033	1	1.7	0	0	0	0
TMETAL	ANTIMONY	5.5	0.8	17	10	0	0	0	0
TMETAL	ARSENIC	110	0.31	174	11.1	31	13	2	0
TMETAL	CADMIUM	2.4	0.28	10	3.5	0	0	0	0
TMETAL	COPPER	1170	7.6	232	160	28	11	1	0
TMETAL	IRON	70900	10100	37	58000	4	0	0	0
TMETAL	LEAD	217	0.84	40	155	2	0	0	0
TMETAL	MANGANESE	49600	100	256	1431	140	80	29	6
TMETAL	MERCURY	75.5	0.025	113	2.28	6	4	2	1
TMETAL	NICKEL	975	5.1	37	2650	0	0	0	0
TMETAL	THALLIUM	9.6	0.46	16	5	3	0	0	0
TMETAL	VANADIUM	169	17.8	37	117	4	0	0	0
TMETAL	ZINC	550	20.8	55	370	2	0	0	0
VOA	1,2-DICHLOROETHANE	0.022	0.022	1	0.28	0	0	0	0
VOA	1,4-DICHLOROBENZENE	0.021	0.009	2	2	0	0	0	0
VOA	NAPHTHALENE	0.32	0.32	1	1.7	0	0	0	0

Table S13. Summary Statistics for All Chemicals within a 40 foot Buffer of Building 281 and within 10 feet bgs, Results for Removed and In-Place Locations

HPS Parcel C, Evaluation of Soil Under Building Cover

Analytical Group	Analyte	Maximum Detected Result (mg/kg)	Minimum Detected Result (mg/kg)	Number of Detected Results	Remediation Goal (mg/kg)	Detected Results Exceeding Remediation Goal	Number of Detected Results ≥ Remediation Goal - 2X	Number of Detected Results ≥ Remediation Goal - 4X	Number of Detected Results ≥ Remediation Goal - 10X
VOA	TETRACHLOROETHENE	1.7	0.002	9	0.48	2	2	0	0
VOA	TRICHLOROETHENE	4.8	0.001	21	2.9	1	0	0	0
VOA	VINYL CHLORIDE	0.005	0.005	1	0.024	0	0	0	0
VOA8260	1,2-DICHLOROETHANE	0.00781	0.00781	1	0.28	0	0	0	0
VOA8260	TRICHLOROETHENE	1.69	0.00987	7	2.9	0	0	0	0

Notes:

mg/kg	milligrams per kilogram
shading	Analyte is considered a chemical of concern for this evaluation; it exceeds 2 times the remediation goal
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PEST	pesticides
SVOA	semi-volatile organic analysis
TMETAL	total metals
VOA	volatile organic analysis
VOA8260	volatile organic analysis by EPA Method 8260

Appendix C

Response to Agency Comments

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Reviewer:	Nars Ancog/Joseph Michalowski
Document:	Draft Sampling and Analysis Plan, Data Gaps Investigation Of Soil Under Buildings on Parcel C, Hunters Point Shipyard, San Francisco, California
Date Reviewed:	
Contractor:	CH2M Hill-Kleinfelder Joint Venture
Contract Number:	N62473-09-D-2622
General Comments:	Notes by Contractor: 1) Worksheet includes only SAP-related comments. 2) Worksheet addresses comments received on the Draft and Draft Final versions of the SAP.

WS/page	H/L	Score	Comment	Response to Comments
Navy QAO Comments and Contractor Responses				
Table of Contents/P. i	For Navy Use Only	For Navy Use Only	The page numbers for Figures 10-1 thru 10-7 are incorrect. Please fix.	Revision made as requested.
SAP WS #2/ p. WS2-4 SAP WS #22/ p. WS22-1	For Navy Use Only	For Navy Use Only	1) On SAP WS #22, it states "No equipment needing calibration will be used." So for this table in the SAP WS #22 row, add "Not Applicable" and state the reason in the last column.	Neither OVAs nor PIDs will be used to collect field measurements. Both Worksheets revised to provide clarification.
SAP WS #3/ p. WS3-1	For Navy Use Only	For Navy Use Only	If anyone on this list will be receiving hard copies of data and/or reports, provide also their mailing address.	Revision made as requested.
SAP WS #11/ p. WS11-3.	For Navy Use Only	For Navy Use Only	Usually, step-out sample locations are determined after preliminary analytical results are obtained.	SAP text revised to explain rationale for step-out location selection.
SAP WS #10/ Figure 10-4	For Navy Use Only	For Navy Use Only	Explain why the step-out sample locations are already shown on Figure 10-4.	Figure 10-4 revised (step-out locations removed to be consistent with other figures).
SAP WS #10/p. WS10-4 thru SAP WS10-15	For Navy Use Only	For Navy Use Only	There are no page numbers on most of these pages. Please add the correct page numbers.	Revision made as requested.
SAP WS #10/ Figure 10-7	For Navy Use Only	For Navy Use Only	It appears this figure was copied from the ROD. There is Figure 10-7 in the upper right corner of page. However, there is Figure 9 and other information at the bottom of page. Please revise this page.	Figure 10-7 revised as requested.
SAP WS #10/Figure 10-7	For Navy Use Only	For Navy Use Only	1) This figure should be Figure 10-7 (See Table of Contents.) Please revise. 2) The page number 20 at the bottom of the page should be SAP WS10-15. Please revise.	Revision made as requested.
SAP WS #11/ p. WS11-2	For Navy Use Only	For Navy Use Only	1st Paragraph: Date for sampling activities is outdated and will have to be changed.	Revision made as requested.
SAP WS #11/p. WS11-2	For Navy Use Only	For Navy Use Only	DQO Step 5. Goals 1 & 2, 2nd Paragraph: Explain what will be done if the target analyte concentrations are below the PALs. This comment was addressed in KCH's Responses to Comments, but was not addressed in the SAP. Please address the comment in the SAP.	Revision made as requested.
SAP WS #11/ p. WS11-2	For Navy Use Only	For Navy Use Only	Also, cross-reference SAP WS #15 for the project PALs.	Revision made as requested.
SAP WS #14/ p. WS14-2	For Navy Use Only	For Navy Use Only	Assessment/Audit Tasks: It states a groundwater sampling Technical Systems Audit will be conducted. Please clarify. In this investigation, only soil samples, Field QC water samples, and IDW water samples are being collected (See SAP WS #15).	Only field soil samples will be collected. SAP text has been revised from "a groundwater sampling Technical..." to "a soil sampling Technical...".
SAP WS #15/ p. WS15-1 thru SAP WS 15-27	For Navy Use Only	For Navy Use Only	Tables 15n, 15s, and 15x start at the middle or bottom of a page. For clarity, start these tables on a new page.	Revision made as requested.
SAP WS # 15/ p. WS15-26	For Navy Use Only	For Navy Use Only	Footnote 5: The footnote for "to be determined" is not clear. Provide the proper footnote, ensuring that an explanation is provided indicating the definition of TBD, why information is not available, and when information will be available	"To be Determined" items have been resolved, and SAP text revised. Footnote #5 has been removed.

WS/page	H/L	Score	Comment	Response to Comments
SAP WS #16/ p. WS16-1			1) Some dates in third column are outdated and will have to be changed.	The dates have been revised as requested.
SAP WS #15/ p. WS15-1 SAP WS #15/ p. WS15-2 SAP WS #15/ p. WS15-4 SAP WS #15/ p. WS15-17	For Navy Use Only	For Navy Use Only	2) The footnote for "to be determined" is not clear. Provide the proper footnote, ensuring that an explanation is provided indicating the definition of TBD, why information is not available, and when information will be available.	To be Determined items have been resolved and SAP text has been revised. Previous footnote #5 related to "TBD" was deleted. New footnote #5 was added to clarify why the PQLG is the same as the QL and the PAL.
SAP WS #17/p. WS17-2 SAP WS #19/p. WS19-1	For Navy Use Only	For Navy Use Only	Soil - VOCs row: The 2-inch diameter by 6-inch long sampling device is the incorrect sampling device. For soil samples being collected for VOC analysis, an air tight coring device should be used and depending on the device used, the holding times may be different. Please also correct the other sections of the SAP where it states a 2-inch diameter by 6-inch long sampling device will be used to collect soil samples for VOC analysis.	For soil samples collected for analysis of VOCs and purgeable TPH, En Core® sampling devices will be used to collect the final soil sample from the sampling sleeve. SAP text revised accordingly.
SAP WS #18-A/ p. WS18-10 & SAP WS18-11	For Navy Use Only	For Navy Use Only	The matrices for the last three sampling locations on p. WS18-10 and the two sampling locations on p. WS18-11 are showing depths versus matrices. Please put in the correct matrices.	Revision made as requested.
SAP WS #18-B/ p. WS18-29 & SAP WS18-30	For Navy Use Only	For Navy Use Only	The matrices for the last four sampling locations on p. WS18-29 and the one sampling locations on p. WS18-30 are showing depths versus matrices. Please put in the correct matrices.	Revision made as requested.
SAP WS #19/ p. WS19-1	For Navy Use Only	For Navy Use Only	Soil - VOCs row: Last column, the correct Maximum Holding Time is 48 hours. Please change.	Revision made as requested.
SAP WS #19/ p. WS19-1 SAP WS #19/ p. WS 19-2 SAP WS #19/ p. WS19-3	For Navy Use Only	For Navy Use Only	Only soil samples, Field QC water samples, and IDW water samples are being collected in this SAP. Explain the type of water samples in this work sheet.	Revision made as requested.
SAP WS #19/ p. WS19-3	For Navy Use Only	For Navy Use Only	Soil - Organic Lead row: Under containers column, is the 4 oz. wide mouth clear glass jar correct? All the other soil sample containers are 2" x 6" SS sleeves.	Text revised for sampling container (revised from glass jar to stainless steel sampling sleeve).
SAP WS #24/ p. WS25-1 thru SAP WS25-4	For Navy Use Only	For Navy Use Only	1) Information provided In the "Corrective Action" column is too brief. Also state what corrective action will be done because stating "correct the problem" is too generic and does not provide enough information.	Revision made as requested. Specific corrective actions have been listed.
	For Navy Use Only	For Navy Use Only	2) The page numbers for this work sheet start with "WS-25". Should the page numbers start with "WS-24"?	Revision made as requested - all inconsistencies in pagination have been corrected.
SAP WS #25/ p. WS25-1 thru SAP WS25-3	For Navy Use Only	For Navy Use Only	1) Under "Inspection Activity" column, explain "Not Applicable".	Revision made as requested. "Not Applicable" has been eliminated; specific inspection activities have been explained.
	For Navy Use Only	For Navy Use Only	2) Under "Frequency" column, provide more information regarding "when indicated" and "as needed".	Revision made as requested. "When needed" and "as needed" have been eliminated; inspection frequencies have been indicated.
	For Navy Use Only	For Navy Use Only	3) The information under the "Corrective Action" column is too brief. Provide more information.	Revision made as requested. Additional explanation has been included.
SAP WS #27/p. WS27-5	For Navy Use Only	For Navy Use Only	Verify that an example sample label is in the SAP.	Example sample label added (as new Figure 27-1).
SAP WS #28/ p. WS28-1 thru SAP WS28-34	For Navy Use Only	For Navy Use Only	Information provided in the "Corrective Action" column is too brief. State what corrective action will be done because stating "correct problem" is too generic and does not provide enough information.	Revision made as requested. Additional explanation has been included.
SAP WS #29/ p. WS29-1	For Navy Use Only	For Navy Use Only	Add the location where the files will be maintained (KCH, APPL, Calscience, etc.).	Revision made as requested.
SAP WS #30/ p. WS30-1	For Navy Use Only	For Navy Use Only	The purpose of this work sheet is to specify which samples go to a specific laboratory for analysis. For the organic lead analysis, set up a new row showing samples will be sent to Calscience for analysis.	Revision made as requested.

WS/page	H/L	Score	Comment	Response to Comments
SAP WS #30/ p. WS30-1	For Navy Use Only	For Navy Use Only	1) If Calscience cannot do the organic lead analyses, will APPL do the analyses? If no, what backup laboratory will be used? This backup laboratory also will need to be added to this work sheet.	Revision made as requested. EMAX Laboratories Inc. will be the backup laboratory for organic lead.
SAP WS #30/ p. WS30-1			2) Under General Notes, it states that the laboratories will be accredited by the CA Department of Public Health Services. Does this mean the laboratories currently are not certified and approved by the Department of the Navy? Please clarify.	All analytical laboratories that will conduct analyses are currently accredited by the Navy. SAP text revised accordingly to clarify.
SAP WS #30/p. WS30-1	For Navy Use Only	For Navy Use Only	Update the contact for EMAX Laboratories. Kam Pang passed away several years ago.	Revision made as requested.
SAP WS #32/ p. WS32-1	For Navy Use Only	For Navy Use Only	Under "Timeframe for Response" column, provide the approximate number of hours/days.	Revision made as requested.
SAP WS #36/ p. WS36-1	For Navy Use Only	For Navy Use Only	Under "Data Validator" column, add Laboratory Project Manager(s).	Revision made as requested.

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WS/page	Comment Made By	Comment	Response to Comments
Work Plan figures	California Dept of Toxic Substances Control (DTSC)	The figure references in the Draft Work Plan should be revised to be consistent with the figure numbers presented in the Sampling and Analysis Plan (SAP). For example, Figure 1 should be changed to Figure 10-1 as presented in the SAP. This comment applies at a minimum to Sections 2.0, 2.1.1 paragraph four, 4.2 paragraph one, and 4.3 paragraph three of the Draft Work Plan.	References to figures in the work plan have been changed to be consistent with the SAP.
SAP WS #10/ p.SAP WS10-2	DTSC	DTSC understands that due to the size of Building 231, Figure 10-6 has divided the building into east (231E) and west (231W) portions. However, this designation has not been presented consistently in the Draft Work Plan text and the SAP and may be erroneously interpreted as referring to different buildings. Therefore, please clarify the naming designations in the text of the Draft Work Plan (Section 2.1.3.1?) and verify that they are consistent between Draft Work Plan text, SAP text, and Figure 10-6	SAP text has been revised as requested.
Executive Summary / p. vii SAP WS #10/ p. WS10-1 SAP WS #10/. p. WS10-2 SAP WS #11/ p. WS11-3	DTSC	Section 1.1 – Objectives and Scope of Work. Please clarify the purpose of an "internal" Draft Record of Decision. Alternatively, the Navy may also consider changing "internal" to "forthcoming" and removing the document from the reference list. Any reference to this document in the Draft Work Plan text would then need to be removed (Section 2.1.5 last paragraph). This comment is also applicable to Data Quality Objective (DQO) Step 6 in SAP Worksheet #11.	The term "internal" is Navy terminology for a draft that is in preparation or is undergoing Navy review and has not yet been released to stakeholders. The title of this document has not been changed. However, SAP text has been revised to change "internal" to "forthcoming" when it is used in places other than the formal document name. Other SAP text references to ROD are correct as written.
SAP WS #11/ p. 11-2 SAP WS #16/ p. WS16-1	DTSC	The field sampling did not begin in September 2009 and should be updated in this text as well as verified in SAP Worksheet #16.	The dates have been revised as requested.
Executive Summary / p. vii	DTSC	The Draft Record of Decision (ROD) is forthcoming and has not been submitted for regulatory review to date. Please update the text accordingly.	The term "internal" is Navy terminology for a draft that is in preparation or is undergoing Navy review and has not yet been released to stakeholders. The title of this document has not been changed. However, SAP text has been revised to change "internal" to "forthcoming" when it is used in places other than the formal document name. Other SAP text references to ROD are correct as written.

WS/page	H/L	Score	Comment	Response to Comments
SAP WS #10 / Figure 10-2	DTSC		SAP Figure 10-2. The specific buildings at which the current investigation takes place should be highlighted to differentiate them from other Parcel C buildings.	Figure 10-2 revised as requested.
SAP WS #10/p. WS10-15 (Fig 10-6)	DTSC		KCH addressed the comment on page SAP WS10-2, but it appears it was not addressed on Figure 10-6. Please add a comment stating that only the east side of Building 231 is being investigated in this study. Also, if the comment was not addressed in the Work Plan, please address the comment.	Revision made as requested.
Figure 10-2	DTSC		Buildings to be investigated are highlighted. However, a description of the highlighted buildings needs to be added to the Legend on the figure.	Revision made as requested.
various SAP WSs	DTSC		DQO Step 6. While the text specifies that the Navy will evaluate analytical results of field soil samples in the context of remedial goals in the Draft ROD and Tier 1 screening criteria for total petroleum hydrocarbons, the Draft ROD has not been submitted for regulatory review to date.	SAP text has been revised to change "internal" to "forthcoming" when it is used in places other than the formal document name.
SAP WS #11/ p. WS11-3			In addition, the text does not provide any details with regards to the type of evaluation that will take place and the evaluation criteria as it relates to the step-out borehole advancement and sampling.	SAP text revised as requested. Step-out locations were previously determined by the Navy in consultation with the regulatory agencies.
SAP WS #15/ various pages	DTSC		Please add a footnote to each table in which "TBD" is listed in the Project Quantitation Limit (QL) Goal and/or QLs that explains why these goals are going to be determined later as well as the basis upon which they will be determined.	All "TBD" entries have been resolved and SAP text revised accordingly.
SAP WS #17/p. WS17-2 SAP WS #19/ pp. WS19-1 & SAP WS19-2	DTSC		Please add a foootnote in the table providing the rationale for not collecting soil samples for VOC analysis using Encore® samplers.	SAP has been revised to include En Core® samplers (or equivalent airtight sampling devices) to be used for soil samples collected for VOCs and TPH-purgeables analysis.
SAP WS #17/ p. WS17-1	DTSC		(a) Paragraph three. Please reference SAP Worksheet #18-A that provides additional more specific targeted sampling depths for each of the proposed borehole locations.	SAP text revised as requested.
SAP WS #10 p. WS11-3			(b) The criteria that will be used to determine if the additional step-out boreholes will be advanced and sampled should be specified in the SAP. See specific comment 7.	SAP text revised as requested. Step-out locations were previously determined by the Navy in consultation with the regulatory agencies.
SAP WS #23/ p. WS23-2	DTSC		Please provide additional details in a footnote regarding the modifications associated with Lab Standard Operating Procedure Number method ANA8015CD (TPH-extractables) that will be implemented for the current project work.	This was a typographic error. SAP text has been revised to change "Y" to "N".
Work Plan	RWQCB		Please revise references to figures to be consistent with the Sampling and Analysis Plan. Figures 1 through 6 should be revised to Figures 10-1 through 10-6.	References to figures in the work plan have been changed to be consistent with the SAP.
SAP WS #3/ p. WS3-2 SAP WS #5/ p. WS5-1 SAP WS #6 p. WS6-1	RWQCB		Please change all references to the Water Board project manager to Ross Steenson, 510-622-2445, RSteenson@waterboards.ca.gov	SAP text has been revised as requested.
various	RWQCB		Please update all table entries that currently read "TBD"	All "TBD" entries have been resolved and SAP text revised accordingly.
SAP WS #10	RWQCB		**Figures 10-3 through 10-6** – The selection of which constituents of concern will be sampled at each location seems arbitrary, based on the information presented in Worksheet#10. Please also reference the additional background information provided in Appendix B, Table E-2.	Figures 10-3 through 10-6 have been revised to include a reference to the Workplan, as requested.
SAP WS #11/ p. WS11-2 SAP WS #16/ p. WS16-1	RWQCB		**DQO Step 4** – This step indicates that sampling for this project will begin in October. Please confirm or adjust this date as necessary. Date changes may also be needed in Worksheet #16 and elsewhere	SAP text has been revised as requested.
SAP WS #11/ p. WS11-3	RWQCB		**Worksheet #15a through 15d** – Project action limits (PALs) in these tables rely on "ROD Remediation Goals" as the basis, even though the ROD has not been submitted or reviewed by the regulators. Please clarify.	SAP WS #11 has been revised to clarify. SAP text has been revised to change "internal" to "forthcoming" when it is used in places other than the formal document name.
SAP WS #15/ p. WS15-26				SAP WS #15 footnote #1 has been revised to clarify.
SAP WS #15/ p. WS15-4	RWQCB		The PAL proposed in the worksheet for Aroclor 1260 is much higher than acceptable risk levels used at other sites. Please revise the PAL for Aroclor 1260 to be consistent with accepted risk levels at other sites.	The PAL as cited in the draft SAP was a typographical error, and has been corrected from 210 mg/kg to 0.21 mg/kg.
Work Plan, Appendix B – Table E-2	RWQCB		The rationale for why no further evaluation was needed at Buildings 272 and 275 reads "COCs were sampled for underneath the buildings", but no information is presented indicating whether concentrations of COCs were of concern. Please include an evaluation of measured COC concentrations in the "Evaluation Summary" sections of Table E-2 for these Buildings	The purpose of this data gap investigation is to provide data from areas within Parcel C that have no historical data. No further evaluation was needed at Buildings 272 and 275 due to the existence of historical data from within these buildings.

WS/page	H/L	Score	Comment	Response to Comments
SAP WS #15/ various pages	RWQCB		The Project Action Limit References in these worksheets all read "Not Applicable." Please discuss what is meant by this. What was used as the basis for this determination regarding the Project Action Limits and associated Practical Quantitation Limit Goals for these worksheets.	These worksheets are applicable only to field QC waster samples and waste samples. The only action to be taken based on these analytical results are evaluation of sample analytical quality control (applicable to the field QC water samples) and evaluation of waste disposal options (applicable to waste samples). Therefore the Project Action Limits for these samples types are the same as the Quantitation Limits and the "Project Action Limit Reference" is not applicable.
Work Plan	EPA		It is unclear how selective analysis at Buildings 134, 203, 214, and 231 will meet the Data Quality Objective (DQO) Goal. Section 1.1 (Objectives and Scope of Work) states that the purpose of the investigation is to determine the lateral extent of copper, lead, manganese, mercury, hexavalent chromium, organic lead, polycyclic aromatic hydrocarbons (PAHs), naphthalene, polychlorinated biphenyls (PCBs) (Aroclor 1260), total petroleum hydrocarbons – extractable (TPH-e), and benzene, toluene, ethylbenzene, and xylenes (BTEX) in soil under certain buildings. However, the text does not clearly state why lead, manganese, mercury, hexavalent chromium, organic lead or PCBs are not analytes of concern beneath Building 134. Please revise the Data Gap WP to clearly indicate why specific analytes are not considered for certain buildings.	COCs were selected for analysis using the decision tree provided in Appendix B as Figure E-1. The results of this decision making process are provided in Appendix B Table E-2.
Work Plan Section 1.1	EPA		It appears that volatile organic compounds (VOCs) and total petroleum hydrocarbons – purgeables (TPH-p) should be identified as analytes of concern in Section 1.1. SAP Worksheet #18B (Sampling Locations and Methods/SOP Requirements Table) and Figure 10-3 (Proposed Soil Sampling Locations – Building 134) of the SAP/FSP/QAPP indicate that VOCs and TPH-p are proposed analyses for locations 134-S-01 and 134-S-02, but these analytes are not listed in Section 1.1.	Sampling for TPH CAP COCs were included after the preparation of the Work Plan. These analytes have been added to Work Plan Section 1.1.
Work Plan	EPA		It appears that the decision tree provided on Figure E-1 of Appendix B does not account for some possible scenarios. Tables E-2 and S1 and Figure A – 1 of Appendix B show that concentrations of tetrachloroethene (PCE) were detected at or above four times the remediation goal (RG) at IR25SG045 in Building 134. In addition, PCE was detected at or above ten times the RG at IR25SB922 outside of Building 134. However, Figure E-1 does not include a decision pathway for the scenario where data exceeds a criterion both inside and outside the building. As such, it is unclear if analytes that should be delineated have been inappropriately eliminated.	The purpose of this data gap investigation is to provide data from areas within Parcel C that have no historical data. No further evaluation was needed for PCE at Building 134 due to the existence of historical data for PCE from within this building.
SAP WS #23 & #28	EPA		The SAP/FSP/QAPP does not provide all laboratory standard operating procedures (SOPs). Please revise the SAP/FSP/QAPP to include all relevant SOPs as discussed in Section 3.2.1, page 71 of 149 of the UFP QAPP Manual. Alternatively, provide a summary of all laboratory procedures in the SAP/FSP/QAPP.	The UFP QAPP Manual requires the documentation of analytical SOPs. SAP WS #23 presents analytical SOP references with measurement performance criteria specified in SAP WS #28.
Not applicable	EPA		Data validation checklists have not been included. Please revise the SAP/FSP/QAPP to provide all information discussed the Uniform Federal Policy for Quality Assurance Project Plan Manual, dated March 2005 (UFP QAPP) for analytical data validation.	Validation checklists are not required per the Navy's Environmental Work Instruction #1, the QAPP Manual, or the Contract Laboratory Program (CLP) National Functional Guidelines for Organic (or Inorganic) Data Review.
Not applicable	EPA		The SAP does not describe manual integrations. If manual integration is required, please ensure that the supporting information for manual integrations (i.e. chromatograms before and after manual integration as well as a brief explanation of the manual integration) will be included in the data package deliverables and evaluated during data validation.	Manual integrations are not required for this project.
SAP WS #17/ p. WS17-2	EPA		It is unclear how non-target analyte data obtained by the Investigation Derived Waste (IDW) analysis will be reported and addressed if unexpected analytes are present at elevated concentrations. Based on the first bullet on Page WS17-2, the target analyte lists for VOCs, semi-volatile organic compounds (SVOCs), and metals analysis for IDW samples was expanded to incorporate the requirements of waste disposal facilities, so it is possible that there could elevated detections of non-target analytes, indicating additional contamination beneath a building. Please revise SAP Worksheet #17 to clarify how non-target analyte data obtained for the IDW analysis will be reported and addressed if unexpected analytes are present at elevated concentrations. Specifically, please clarify whether the soil contributing to IDW samples will be easily identifiable so that additional samples could be collected from the IDW sample source location, if necessary.	It is correct that analysis of waste samples includes an expanded list (of non-target analytes) for the purposes of waste characterization (for evaluation of waste disposal options and waste profiling). By definition, non-target analytes that might be present in waste samples are not chemicals of concern with respect to the Data Gap Investigation. Waste sampling analytical results will be reported in the Technical Memorandum. Investigation-derived waste containers will be labeled as to the boreholes from which the waste was generated.
SAP WS #17 p. WS17-2	EPA		The party responsible for the disposal of the concrete cores generated by boring through the building floors has not been identified. According to the last sentence on Page WS17-3, "Concrete cores (to be generated by coring through the building floors) will be left at each work area for disposal by others." The party(ies) that will dispose of these cores should be specified. In addition, it is unclear if these cores need to be screened for radiation. Please revise SAP Worksheet #17 to provide the party responsible for the disposal of the concrete cores generated by boring through the building floors and clarify if these cores will be screened for radiation.	Concrete cores will be handled as IDW in compliance with SAP WS#14.
SAP WS #17/ p. WS17-3 SAP WS #27	EPA		The SAP/FSP/QAPP does not provide examples of all forms to be used with the project. Please revise the SAP/FSP/QAPP to include copies of data reporting forms, sample labels, and custody seals.	Boring log to be used on project has been included in SAP WS #17. All information to be included on sample lablels is included in SAP WS #27. All other field information will be documented in field logbooks.
SAP WS #15 p. WS15-26	EPA		The SAP/FSP/QAPP states that results will be reported relative to dry weight of samples. However, it is unclear whether the values reported in Worksheet #15 are presented in dry or wet weight. Please revise the SAP/FSP/QAPP to clarify whether values presented in Worksheet #15 are presented in dry or wet weight.	Footnote has been added to SAP WS #15 clarifying that all SAP WS values are relative dry weight of sample.
SAP WS #35/ p. WS35-5	EPA		The SAP does not provide sufficient information about data validation. For example, the SAP states that 80 percent of the data will undergo Level III data validation and 20 percent will undergo Level IV validation. However, the SAP does not define the difference between Level III and Level IV data validation, nor does it discuss why the proposed levels of validation are deemed sufficient. Further, the SAP does not indicate how the samples are selected for Level III and Level IV validation. Please revise the SAP/FSP/QAPP to provide this information for all proposed validation.	Navy Environmental Work Instruction No. 1: Chemical Data Validation (Navy, 2001) will be followed. SAP text has been revised for clarification.

WS/page	H/L	Score	Comment	Response to Comments
SAP WS #28m SAP WS #28n	EPA		The SAP states that U.S. EPA Method 6010C will be used to analyze metals. However, the SAP does not include post digest spikes (PDS) for metals analysis. According to Method 6010C, a post-digest should be run if the matrix spike/matrix spike duplicate (MS/MSD) fails.	SAP has been revised to include post digest spikes for metals analysis.
Work Plan	EPA		Figures 1 and 2, referenced in Section 2.1.1, have not been provided. Please revise the Data Gap WP to include Figures 1 and 2 or reference Figures 10-1 (Basewide Site Plan) and 10-2 (Site Plan – Parcel C) of the SAP/FSP/QAPP.	References to figures in the Work Plan have been changed to be consistent with the SAP.
Work Plan Section 2.1.3.1, pp. 2-2 & 2-3	EPA		Some site features referenced in Section 2.1.3.1 are not included on figures. For example, the locations of the two underground storage tanks (USTs) closed in place at Building 231 are not presented on Figure 10-6 of the SAP/FSP/QAPP or Figure A-4 of Appendix B. Please revise the Data Gap WP figures to include relevant site features.	Figures were generated using the site plan provided and have been discussed and approved by the BCT.
Work Plan Section 4.2, p. 4-2	EPA		Section 4.2 states that, "Fourteen (14) initial boreholes will be advanced at locations shown in Figures 3 through Figure 6 of the SAP in accordance with the procedures detailed in the SAP" but the SAP/FSP/QAPP does not utilize these figure numbers. Please revise the Data Gap WP to reflect the correct figure numbers.	References to figures in the work plan have been changed to be consistent with the SAP
Figure 10-4	EPA		It is unclear why a step-out borehole has not been proposed north or northwest of 203-S-01. As such, it is unclear how potentially detected contaminants at 203-S-01 will be bound if detected. Please revise the Data Gap WP to include a step-out borehole north of 203-S-01 to aid in the delineation of any detected contaminants.	A step out-boring has not been proposed at this time. If the initial field work indicates that a step-out boring is required in this location, then the Navy will identify a proposed step-out location will seek approval from the BCT.
SAP WS #15/ p. WS15-26	EPA		**Pages WS16-1 through WS16-3:** It is unclear how some target analytes presented in the Worksheet #15 (e.g., benzene; ethylbenzene, naphthalene) will be evaluated since they have both Remediation Goals and Tier 1 Screening Criteria listed as the project action limit (PAL). Please revise the SAP to clarify which value will be used to evaluate data.	As discussed in WS #11, some analytes are applicable to both the "Fill ROD Data Gaps" and "Provide Data for TPH CAP" SAP goals. When an analyte is applicable to both SAP goals, the analytical result will be evaluated relative to both SAP goals, using the goal-specific PAL. Footnote #1 has been revised as requested.
SAP WS #17/ p. WS17-1	EPA		It is unclear which naphthalene result will be utilized when naphthalene is analyzed as both a PAH and a VOC. Based on the third bullet on Page WS17-1, naphthalene will be analyzed as a PAH by EPA Method 8270 and as a VOC by EPA 8260B at select sampling locations. As such, it is unclear if one method will be prioritized over another or if the highest concentration will be considered primary. Please revise SAP Worksheet #17 to clarify which naphthalene result will be utilized when naphthalene is analyzed as both a PAH and a VOC.	As discussed in WS #11, some analytes are applicable to both the "Fill ROD Data Gaps" and "Provide Data for TPH CAP" SAP goals. When an analyte is applicable to both SAP goals, the analytical result will be evaluated relative to both SAP goals, using the goal-specific PAL. Footnote #1 has been revised as requested.
SAP WS #17/ p. WS17-2	EPA		Details regarding storage of equipment following decontamination have not been provided. For example, it is unclear how decontaminated equipment will be stored (e.g., wrapped, labeled) between sampling and overnight. Please revise SAP Worksheet #17 to provide details regarding the storage of equipment following decontamination to ensure cross-contamination does not occur.	Revision made as requested.
SAP WS #17/ p. WS17-2	EPA		This table references Worksheet #17 for the sampling SOPs. However, Worksheet #17 does not provide enough detail on the soil sampling procedure. Please revise the SAP to include more detail on how the mechanical auger and manual-operated slide hammer will be used to sample soils for this project.	Revision made as requested.
SAP WS #19 p. WS19-1	EPA		This table contains incorrect information. The table states that holding time for soil VOCs samples is 14 days. However, soil VOC samples need to be analyzed within 48 hours or frozen and then analyzed within 14 days. Also, the table states the sample volume for water VOC samples is 20 milliliters (mL), but this volume should be 120 mL.	SAP has been revised to include En Core® samplers (or equivalent airtight sampling devices) to be used for soil samples collected for VOCs and TPH-purgeables analysis. Holding times have been revised (to 48 hours) as requested.
SAP WS #20/ p. WS20-1	EPA		This worksheet contains the incorrect number of matrix spike/matrix spike duplicate (MS/MSD) samples for soil copper samples. The tables states that soil copper samples a single MS/MSD will be collected for 23 samples locations. However, if MS/MSD samples are collected at a rate of 1 per 20 samples, the table should state that two MS/MSD samples will be collected. Please revise the table to address this discrepancy.	Revision made as requested.
SAP WS #23/ p. WS23-2	EPA		It is unclear how laboratory SOP ANA8015CD, Total Extractable Petroleum Hydrocarbons – Diesel, Rev. 0, 06/16/09, has been modified for project work. Please revise the SAP to clarify how SOP ANA8015CD has been modified for this project.	Revision made as requested.
SAP WS #24/ p. WS24-1 thru SAP WS24-4	EPA		This table is missing information. For example, the tuning criteria for Gas Chromatography/Mass Spectroscopy (GC/MS) is not included. Additionally, the initial calibration verification (ICV) criteria is not included for metals analyses. Please revise the table to include all calibration procedures for the listed analytical instruments.	Revision made as requested.
SAP WS #28/ p. WS28-1 thru SAP WS28-34	EPA		This table states that the corrective action for MS/MSD samples that are out of quality control (QC) acceptance limits is to examine the project specific DQOs, but this will not address the problem. Please revise the SAP to clarify what action (e.g., examining the surrogate and LCS recoveries, etc.) will be taken if the MS/MSD samples are out of the measurement performance criteria.	Revision made as requested. Additional explanation has been included.
SAP WS #24	EPA		This table is lacking all the appropriate QC samples (e.g., serial dilutions, interference checks, etc.). Please revise the table to include all necessary QC samples.	Revision made as requested. Linear dynamic range and interference check solutions were added to SAP WS #24.
SAP WS #28m SAP WS #28n				Revision made as requested. Post digestion spikes and serial dilutions were added to SAP WS #28m & SAP WS #28n.
SAP WS #29/ p. WS29-1	EPA		The SAP does not discuss all of the required information pertaining to the project files such requirements for data package and hard copy report contents, and the length of time and location documents will be stored. Please revise the SAP to include the level of detail presented in Section 3.5.1, Project Documentation and Records, page 88 of 149, of the UFP QAPP Manual. Please also ensure that the length of time and location at which documents will be stored is specified.	Revision made as requested.
various	EPA		The page numbers used in the SAP are inconsistent. For example, Worksheet #15 is paginated as WS16-1 through WS16-26 instead of WS15-1 through WS15-26. Additionally Worksheet #24 is paginated WS25-1 through WS25-4 instead of WS24-1 through WS 24-4. Please revise the SAP to address these discrepancies.	Pagination revised as requested. All inconsistencies in pagination have been corrected.

WS/page	H/L	Score	Comment	Response to Comments
SAP WS #2/ p. WS2-1 SAP WS #10/ p. WS10-1 SAP WS #11/ p. WS11-1 SAP WS #11/ p. WS11-3 SAP WS #13/ p. WS13-1 References/ p. R-1	City and County of San Francisco Department of Public Health (SFDPH)		**2.1.5 Summary of Previous Investigations and Remedial Actions:** The first sentence in this section refers to information provided in the Parcel C ROD; however, that document is currently in the Internal Draft stage and so has not yet been distributed to the readers of this Draft Work Plan. Furthermore, it seems that the intent is to finalize this Work Plan prior to finalizing the ROD. We therefore recommend referencing the Final Parcel C Feasibility Study Report (July 31, 2008) instead of the ROD for any site information. In this specific instance, please reference the section in the FS in which the information regarding previous site investigations and remedial actions can be found.	SAP text has been revised to update the reference for the Feasibility Study Report (from Draft to Final). The remaining SAP text is correct as written.
Work Plan Section 2.1.5				The reference to the internal Parcel C ROD has been changed to reference the appropriate sections of the Feasibility Study Report for Parcel C (July 31, 2008).
Work Plan Section 2.1.5	SFDPH		The last sentence in the first paragraph mentions that evidence of low-level radioactivity has been detected. Please provide a brief description of the nature and extent of radiological impacts in each of the four buildings that are the subject of this work plan and reference the document in which more detailed information can be found (e.g., FS Report).	A reference to the Historical Radiological Assessment (August 31, 2004) has been added.
Work Plan Section 2.1.5	SFDPH		The last sentence in this section states that past remedial actions implemented at Parcel C are described in the Parcel C ROD. Again, the internal draft is not available to the readers of this work plan. Please reference the specific reports in which information can be found regarding the previous soil characterization and soil excavation work performed to date in the vicinity of the four buildings that are the subject of this work plan (i.e., not an exhaustive list of reports for Parcel C); the referenced report(s) should provide all of the original site characterization data relied upon in preparing this Work Plan, in particular the compilation of background information presented in Appendix B.	The reference to the internal Parcel C ROD has been changed to reference the appropriate sections of the Feasibility Study Report for Parcel C (July 31, 2008).
N/A	SFDPH		Figure 10-3 indicates two sampling locations within Building 134 and lists seven analytes (or analyte groups) that will be analyzed for: BTEX, copper, naphthalene, PAHs, VOCs, TPH-p, and TPH-e. However, Table E-2, Evaluation of Soil Under Buildings at Parcel C, presented in Appendix B recommends that samples from these two locations be analyzed for copper and PAHs. We assume that the additional five analyses are related to the expansion of the project scope to include analyses related to the TPH CAP. However, it is unclear how these five analytes/groups were selected and what the process was for including one or more of these five in the list of analytes/groups for each soil sample, as listed in SAP Worksheet #18A and shown in the various figures. Consider adding an Appendix C that would provide a building-by-building, step-by-step rationale for selection of TPH CAP-related analytes/groups, as was done in Appendix B for CERCLA analytes/groups.	The additional analytes at these locations were added using a similar logic to the other locations. During the screening process it was determined by the BCT that the potential for these analytes exists. As such, they were added to this data gaps investigation.
SAP WS #10	SFDPH		Also in Figure 10-3, it is unclear why the four step-out sample locations mentioned in the legend are not shown, as Building 203 stepout sampling locations are shown in Figure 10-4. It is understood that the need for, precise location of, and analytical suites for stepout samples will be evaluated and adjusted based on the analytical results reported for the primary samples, but it is unclear why the topic of stepout samples is treated differently on the figures for each of the four buildings (Figures 10-3 through 10-6). Please resolve this difference between the four figures or provide an explanation/discussion regarding stepout sampling somewhere in this Work Plan that supports their treatment in these figures.	SAP WS #11 text has been revised to explain Navy strategy for determining step-out locations. Electronic link to revised SAP text is at Navy QAO comment #3. Step-out locations have been removed from Figure 10-4 for consistency with other figures.
Work Plan Section 1.1.1	SFDPH		Second paragraph, first sentence – Insert the word "gap" in the sentence as follows: "… the Navy needs to complete a data *gap* investigation…"	Revision made as requested
Work Plan Section 2.2.1.5	SFDPH		The paragraph re. 2002 Groundwater Data Gaps Investigation, second sentence – change the word "sample" to "samples" as follows: "… collecting groundwater *samples* from both new and existing monitoring wells…	Revision made as requested
Other revisions made by Contractor				
SAP WS #1/ p. WS1-1 SAP WS #3/ p. WS3-2 SAP WS #6/ p. WS6-1 SAP WS #7/ p. WS7-2 SAP WS #32/ p. WS32-1	N/A		Changed Program QAM from Artemis Antipas to Stacie Wissler	

WS/page	H/L	Score	Comment	Response to Comments
SAP WS #3/ p. WS3-2 SAP WS #4/ p. WS4-1 SAP WS #5/ p. WS5-1 SAP WS #7/ p. WS7-3	N/A		Changed Project QAO from Stacie Wissler to Mohammad Abri	
SAP WS #1/ p. WS1-1 All SAP WS headers	N/A		Date of SAP document revised.	N/A
Table of Contents multiple SAP WSs	N/A		Document pagination changed to reflect revisions.	N/A
SAP WS #28 p. WS28-30 SAP WS #28 p. WS28-32	N/A		Deleted footnote #1. This was a correction.	N/A
SAP WS #32/ p. WS32-3	N/A		Technical Systems Audit form updated.	N/A
Acronyms and Abbreviations SAP WS #3/ p. WS3-2 SAP WS #4/ p. WS4-1 SAP WS #5/ p. WS5-1 SAP WS #6/ p. WS6-3 SAP WS #7/ p. WS7-3 SAP WS #37/ p. WS37-4	N/A		All "TBD" entries related to data validation firm have been updated to include firm-specific information.	N/A
Executive Summary/ pp. vii & viii SAP WS #17/ p. 17-2	N/A		Revised soil sampling procedures to include slant-drive auger drilling of one borehole, to accommodate sampling location access restrictions.	N/A
SAP WS #12/ p. WS12-1	N/A		MTBE added as an analytical group. This was a correction to an inadvertent omission.	N/A